American Engineer

ENGINEERING—

Red China's Bridge to the Future?

(See Page 21)

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American Engineer

MARCH 1961
Vol. 31, No. 3

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Letters to the Editor

Laymen & the Public . . .

Dear Editor:

It is interesting to observe how one may get safely by on a point of argument by the twist given to the original or prior idea expressed. In this case it is the concept of the term "laymen."

A letter by Mr. Sanford V. Lenz, P.E., of Newark, N. J., in the October, 1960, issue of AMERICAN ENGINEER, referred to a "basic hallmark" of a true profession. In part it stated, "Laymen do not tell doctors how to heal, or lawyers how to argue, or ministers how to preach. But employed engineers in industry are forever being told how to engineer by bright young men with degrees in business administration or economics."

At least the reference to "bright young men" may not be construed to mean "laymen," and it is obvious that "business administration" and "economics" are terms that are distressing to Engineer Lenz.

This distress is not surprising in view of the plight of U. S. marketing conditions, both foreign and domestic, due largely to the excessive and inflationary demands made by "forceful organizations" that resulted in higher and higher prices to the general public. It is good to know the bright young men of today understand economics and may be trying to do something about inflation and sky-high prices.

The terms "laymen" and the "general public" may be considered synonymous. It is they who are interested in the quality and price of industry's products. Business administration and sound economics play an important part to satisfy these ends.

F. D. FARRINGTON, JR., P.E. & L.S.
Trenton, N.J.

Leave Civils Alone . . .

Dear Editor:

It seems to me you could have published a better article than the one by Mr. Medenica (AE, Jan., 1961). It disgusts me to read an article which contains half of the story.

It is my opinion that anytime anyone starts to run down our educational system, that someone has a hole in his head.

My further opinion is that anytime someone says a civil engineer doesn't need and use all the branches of civil engineering, he just doesn't know what he is talking about. Furthermore, an opinion by anyone that the die is cast by the first job a civil takes, just doesn't make good sense.

Now as to specialization by the civil engineer, just ask any engineer, especially those who have gone down the road a piece. He'll tell you, "No, I wouldn't specialize. There's too much chance you'll starve to death." In fact, if you ask a civil why he didn't specialize, he will more often than not tell you that is why he took civil; he didn't want to specialize. A civil engineer is an entirely different type of individual from any other engineer, a fact which should be taken into account when you start trying to change him.

W. J. YOUNGERMAN, P.E.
Fairmont, Minn.

Specialize First . . .

Dear Editor:

I would like to voice whole hearted agreement with several ideas presented by Mr. Medenica in his article, "At The Crossroads of Engineering Education," (AE, January, 1961).

I agree 100 per cent with his thoughts about requiring higher standards in high schools and permitting diversification of study at the college level *only* after the student has earned a bachelor's degree in a specialty.

However, I feel strongly that the engineering student studying for a bachelor's degree should not be *required* to specialize in, say anything as "narrow" as structural engineering, but should be *permitted* to do so if he desires. This would enable the young man who definitely knows what specific job he wants (such as structural engineering) to learn in the four or five years of study for a bachelor's degree what today would require him also to earn a master's or even a doctorate degree.

GLEN L. BELLOWS, E.I.T.
Urbana, Illinois

Stimmel Inconsistent . . .

Dear Editor:

Mr. Clayton H. Stimmel is hardly consistent in his article in the January, 1961, issue of AMERICAN ENGINEER. The example he cites in his discussion on the need for unity between older engineers and recent graduates negates much of his argument.

If we are to continue using the medical and legal professions as criteria for professional standing of engineers, let us continue the comparison further. Mr. Stimmel may not realize it, but even after graduation from graduate school, the fledgling doctor and lawyer are forced to undergo internships of one sort or another. Why should the engineer be excused from performing his internship? During the doctor's internship he performs tasks normally assigned to technicians, strickly for their educational value. The new lawyer frequently does work that is straightforward routine for a clerk, also to learn. The motivation for assigning such tasks is that the doctor or lawyer can hardly use information provided by others without understanding the limitations and full meanings of such information.

Mr. Stimmel's recent civil engineering graduate may not have been adding to his professional standing by doing the routine tasks of a survey party, but he was being taught something that would enable him to direct technicians in the future (even if it was only how much time was spent on coffee breaks). No one can direct the work of others without an adequate understanding of what his subordinates are supposed to do and how it should be done.

I am not trying to be either condescending or sarcastic when I point out that responsibility is not given, it is taken. It can be taken only when the taker has demonstrated sufficient ability for others to relinquish it. Less than thirteen years have passed since my graduation, but that truism was forcibly pointed out to me soon after graduation and has been repeatedly demonstrated since.

Apropos of this inevitable comparison between engineering and the legal and medical professions in our striving for professional status, I wish someone would come up with a different model on which to base professionalism. I'm not looking forward to a rash of malpractice suits, scathing criticisms of

(Continued on page 50)

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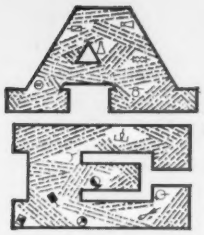


"This Month"

Like it or not, Red China appears to be here to stay . . . a force to reckon with. How does engineering figure in the unlimbering of this restless giant? A staff report, beginning on page 21, brings us up to date.

NSPE officers do an outstanding job for the organization and for the profession. And unlike many such groups, Society Veeps get a real workout! Find out just how much by starting a new series on page 27.

"This Month's" Photo Story: Navy's Sugar Grove Radio Telescope-Space Station in the Wilderness. It's on page 31 and tells an interesting story of the Big Dish.

The AE had its own reporter on the spot at the 13th College-Industry Conference sponsored recently at the U. of Cincinnati by the American Society for Engineering Education. This is an excellent story–page 33–on what big and little industry is doing to foster professionalism. And in a companion story–page 38–a Phillips Petroleum executive details that firm's program for professionals.

If you could not get to the recent NSPE Board of Directors meeting at Des Moines, you will want to read the full story beginning on page 44. Your Society is on the move–find out how and why.

Scanning the news pages:

General. Page 6. The lead story covers the recently released EJC salary survey and we learn that salary levels are up 5 per cent in the last 2 years. In another story the news is about a plan of the Chicago Chapter, ISPE, for a visitors' bureau for visiting engineers. And in still another report, the latest is that recruiting of engineers dropped toward the end of last year.

Consulting. Page 9. The functional section needs money and this lead story tells how it will be used. In other action NSPE urges a change in a House bill that would call for all engineering (for new college construction) to be done by a Federal agency.

Industry. Page 11. Engineers' unions may be on the ropes but they are far from dead. Read here how the AFL-CIO is already planning a come back. In other union news we learn that employees of a Youngstown, Ohio, consulting firm rejected union representation, 25 to 9. Two other stories cover two surveys: Pay of English engineers, and the latest Endicott Survey on trends in employment.

Education. Page 13. Among the headlines: Stevens' Graduates Reach High in Starting Salaries . . . Business Firms Make More Use of College Courses . . . Guggenheim Scholarships Available for Space Study . . . ASEE Survey Shows Student's View of Graduate School.

Government. Page 15. Congressman Anfuso has introduced a bill calling for a National Science Academy . . . this story tells why NSPE is opposed. In a further story we learn of the Rhodes bill which would promote Federal employee unions. And in a final development, Sen. Kefauver has introduced a bill to establish a Department of Science.

Registration. Page 17. Don't fail to read the complete coverage here of a case in Detroit where the registration law has been called unconstitutional.

That's it for "This Month."

Kenneth E. Trombley

Editor

1960 EJC Survey Shows Increased Pay for Engineers

Engineers' salary levels rose approximately five per cent per year between 1958 and 1960 according to a survey conducted by the Engineering Manpower Commission of Engineers Joint Council. The over-all median salary now stands at $9,600. The recent increase of five per cent may be compared with an average annual increase of 6½ per cent between the years 1953-1958. Eight years ago (1953) the first in this series of surveys found the median salary for engineers at $6,500. These findings were made public recently by EMC in the fourth of a series of surveys entitled, "Professional Income of Engineers—1960" which covers approximately 200,000 engineering graduates in industry, education and government.

The report, which was announced by Dr. Sydney B. Ingram, newly elected chairman of the Engineering Manpower Commission, also shows that engineers are a young group, with median age of about 32, based on a graduation average age of 22. Salaries increase more during the early years of an engineer's career and begin to slow down at about 20 years of experience. Recently, this tendency has been less pronounced.

There is a marked difference between engineering salaries in industry, government and education, with the highest level in industry, followed by education and government. Of particular note is the 14.3 per cent increase in the total professional income of engineering teachers between 1958 and 1960.

The Engineers Joint Council's report contains data on engineers' salaries in 22 subdivisions of industry (164,657 engineers) including separate curves for all industry Ph.D., Sc.D. and M.S. graduates. Also covered are engineering salaries in all levels of government (20,491 engineers), separated into Federal, state and local categories, college teachers (over 5,000) technical institute teachers and engineering societies. In fact, the report covers about a quarter of the engineering force of the United States.

Earnings of engineers continued their upward trend, observed in the previous survey intervals 1953-56-58. The over-all median (for all graduates) was $6,500 in 1953, $7,750 in 1956, $8,750 in 1958 (about 6.5 per cent annually) and $9,600 in 1960 (up about five per cent annually). The latter represents an increase from mid-1958 to mid-1960. For this same two-year span the Consumer Price Index rose 2.3 per cent and the average gross weekly earnings for production (manufacturing) climbed close to 8.9 per cent.

Kennedy Salutes Engineers During Engineers' Week

On the eve of National Engineers' Week, February 19-25, the following message was sent to NSPE President Noah E. Hull from United States President John F. Kennedy:

"National Engineers' Week is an opportunity for all Americans to recognize the contributions made by the Nation's engineers to the technological, economic and military strength of the United States. It is also an opportunity to emphasize the importance to the Nation of encouraging more young people to seek professional careers in engineering.

"Future progress in engineering will increasingly depend on educating our new engineers with the depth of understanding that lies at the frontiers of science. This, in turn, requires more concern with the quality of education in science and engineering in order to foster the rapid and sustained growth of American science and technology."

Bureau To Aid Visiting Engineers Established

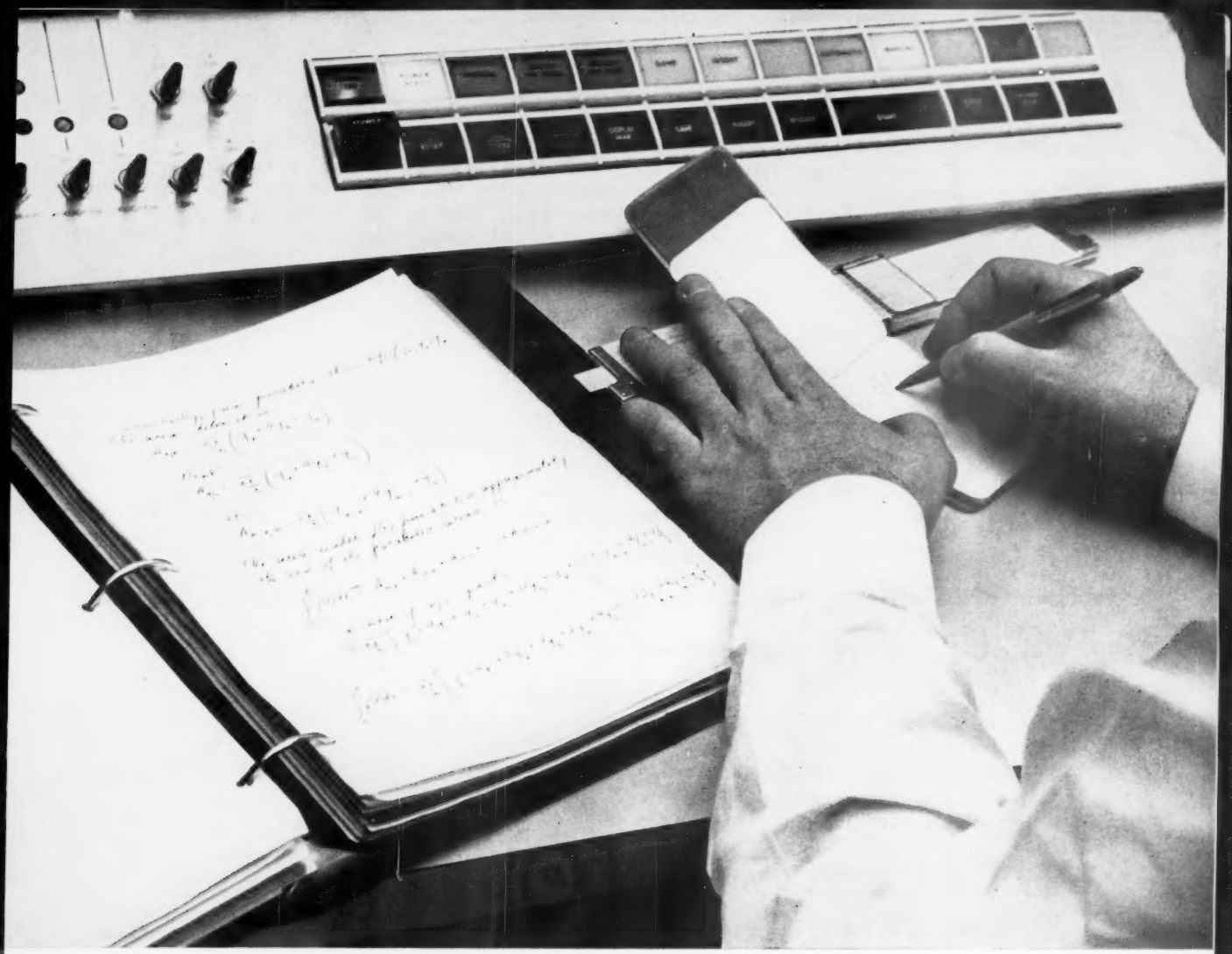
Foreign engineers who visit Chicago in the future will find at their service a visitors' bureau established by the Public Relations Committee of the Chicago Chapter of the Illinois Society of Professional Engineers. The bureau will assist foreign visitors in obtaining a better view of the engineering profession in the United States.

The visitors' bureau in Chicago will be patterned after one started in New York by the Metropolitan Section of the American Society of Civil Engineers. ASCE organized their bureau late in 1959 after questioning a number of individuals and groups to conclude that a real need existed for such a bureau. The Chicago bureau will serve as a coordinating agency and source of information for foreign engineers who wish to view construction projects, industrial plants, design offices or any other points of interest of an engineering nature.

Types of services which may be performed by the bureau are expected to be quite varied. Edward Dembitz, chairman of ASCE's first Engineering Visitors Committee, said some of the services they performed during the first year included providing introductions to professors, arranging tours to various offices or examples of construction, locating local living accommodations, and even buying theater tickets.

One reason for the establishment of such bureaus is to reciprocate

(Continued on page 8)



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(Continued from page 6)

for the warm hospitality frequently shown to American engineers who travel abroad. Visitors in the United States, if left to their own devices, may miss seeing some of the better examples of work done in their own fields. The ASCE committee has been asked to locate examples of prestressed concrete construction and small tunnels through earth.

Like the ASCE committee, the Chicago Chapter plans to operate the bureau on a referral basis rather than advertise extensively, since men who will be offering their services are themselves actively engaged in a profession.

Several Campuses Plan Summer JESSI Sessions

Present tenth and eleventh grade high school students across the country will have an opportunity of attending one of several Junior Engineers' and Scientists' Summer Institute (called JESSI) sessions in June following the close of school.

The two-week JESSI program is designed to help remove the guess from school and college program and career decisions by giving interested high school juniors and seniors an academic insight into the pure and basic applied sciences, and some knowledge of the study programs and career opportunities in the science and engineering fields.

Started in 1956 at Oregon State College, JESSI is now held on several campuses across the Nation. Applicants will be admitted up to the opening day of the session, or until the roster is filled.

Particulars may be obtained from the local high school counsellor, or the mathematics and science teachers and from Scientists of Tomorrow, 309 New Fliedner Bldg., Portland 5, Oregon.

Recruiting of Engineers Drops at End of Year

The sharpest drop in recruitment advertising during the past six months was recorded in the December figures of the Deutsch & Shea Engineer/Scientist Demand Index. A total Index figure of 78.9 was registered in December, as against 113.3 for the preceding month. This 34.4 drop carries the Index well below even the base month of July.

The drop is regarded by Deutsch & Shea, not as an indication that demand for engineers and scientists has fallen off significantly, but as an expected seasonal reaction that reflects the recruiting methods employed by most companies. December traditionally sees a great reduction in the number of out-of-town recruiting trips made by firms. This in turn is due to a demonstrated reluctance on the part of professional men to consider job changes during the busy holiday season. "The cessation of recruiting activities in the holiday season," said a company spokesman, "reflects the realistic acceptance by recruiting firms that few people will change jobs prior to the distribution of end-of-the-year bonuses and other rewards."

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(Circle 3 in Readers' Service Dept.)

Functional Section Begins Drive for Additional Funds

To support an expanded program and to supplement budget allocations from NSPE, the Functional Section for Consulting Engineers has begun its 1961 drive to raise additional funds through contributions from individual consulting firms.

Conforming to the NSPE policy of grass-roots control, the campaign will be conducted by state functional sections, with local conditions dictating the best methods for supporting the program. In states not yet having organized functional sections, letters of solicitation will be sent directly from Functional Section Chairman L. M. Van Doren to all consulting firms.

The target of the drive is to match the $9,000 allocated to Functional Section activities by the NSPE Board of Directors to meet the projected financial need for $18,000. The suggested individual contribution is $5 for each professional engineer in a firm.

Van Doren's letter, mailed to over 1,600 consulting firms, contains a complete description of the proposed 1961 budget and program. Among planned activities are the following:

- Continue publication of *Private Practice News;*
- Promote full utilization of the survey report, *The Role of the Consulting Engineer in Federal Public Works Projects,* to offset criticism and policies restricting the use of consultants on such work;
- Testify before Congressional committees and Federal agencies in support of consultant programs and interests;
- Promote close cooperation with other consulting groups;
- Sponsor additional regional meetings for consulting engineers;
- Issue brochure describing features of professional liability insurance;
- Continue joint efforts with the American Institute of Architects to improve engineer-architect relations and professional working arrangements;
- Develop a public relations program to present a more realistic "image" of consultants to clients and the general public.

NSPE Director Urges Change in College Bill

What would appear to be a no-consultant provision in a House bill to help colleges finance construction of new facilities has drawn a strong request for amendment from NSPE Executive Director Paul H. Robbins.

Known as the "College Facilities Act of 1961," H.R. 951 was introduced by Representative Frelinghuysen of New Jersey to "assist institutions of higher education to market and retire bonds issued by them to finance the construction of college facilities." The bill would guarantee payment of college bonds and would authorize the Federal payment of up to 25 per cent of bond principal. To qualify for the 25 per cent payment, the needy college would have to show that the construction would either (1) increase enrollment capacity, (2) prevent a decrease in capacity, or (3) provide facilities for instruction or research in the natural sciences or engineering.

A qualification tacked onto the bill, however, would attempt to prevent "elaborate or extravagant design" by specifying that all architectural and engineering services required in administration of the Act must be performed by the Housing and Home Finance Administration.

In a letter to Representative Frelinghuysen, Robbins praised the intent of the bill, but questioned the relegation of engineering services to the HHFA. "We share your desire for the economical design of Federally assisted educational facilities . . ." said Robbins. "Certainly private engineering design consultants, and architects as well, deplore any design or specifications which could result in an unnecessarily elaborate or extravagant project. To do otherwise would be contrary to recommended ethical practices and would constitute a disservice to the client, be it a Government agency or a private individual."

Robbins pointed out that colleges and universities have had considerable experience in recent years in arranging for the planning and design of facilities, and that such work has been accomplished mainly through consulting engineers, to the satisfaction of all. "Accordingly," concluded Robbins, "we have no doubt that the educational institutions can be entrusted with a continuation of their practice to handle the arrangements for the design of new facilities on a basis consistent with their experience and responsibility."

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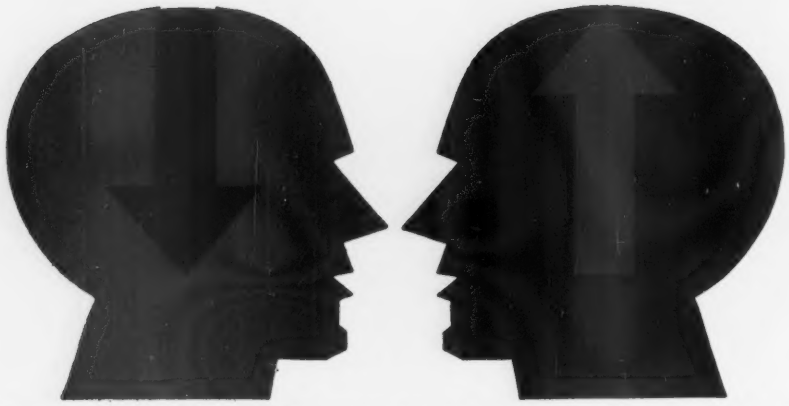


There are significant differences in the professional attitudes and objectives of engineers in industry, and the latest PECBI survey report* shows what these are and why.

*ENGINEERING PROFESSIONALISM IN INDUSTRY:

A study of engineers and managers made by Opinion Research Corporation for the Professional Engineers Conference Board for Industry, in co-operation with the National Society of Professional Engineers.

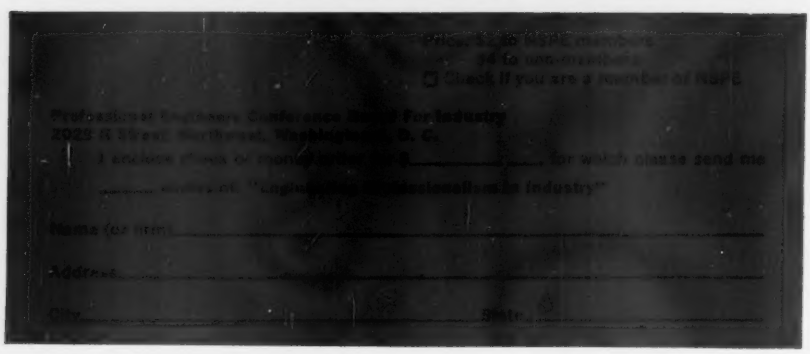
Did you know that:

One out of four engineers in industry surveyed believes that engineers are thought of as second class professionals, but no industrial managers agree with this opinion.

Sixty-one per cent of the engineers employed in industry think there is considerable mal-utilization of engineers, but only 30 per cent of industrial managers agree.

More than half the engineers in industry think that higher pay would advance the engineering profession, but only 20 per cent of industrial managers agree.

Forty-four per cent of the engineers in companies which score high on efforts to encourage and develop high standards of engineering professionalism feel that management really believes in the professional status of engineers, while only seven per cent of the engineers in companies not scoring so high in such efforts agree with this.



Union Officials Hope for Future Engineers' Unions

In the absence of any recent successes in organizing significant new units of engineers and other white collar workers, industrial union officials continue to look to the future for a change in luck.

In a paper presented before the Industrial Relations Research Association in St. Louis recently, Everett M. Kassalow, research director of AFL-CIO's Industrial Union Department, points to the increasing proportion of white collar jobs in the labor force and requests a "structural face lifting" to provide a special department or division for white collar worker problems in the AFL-CIO.

While admitting that engineers have a strong desire for purely professional association, Kassalow says, "I am convinced that one reason why some of the white collar engineering unions of the past decade collapsed was their failure to develop among their members a clear cut acceptance that a union must act and regard itself as a union. Attempts to cover this with the notion that the organization is of a purely professional character and/or an arm of management will not stand up in the long run before aggressive management. This, in part at least, seems to be a lesson of the experience of the Western Electric engineers, who were recently decertified as a result of a combined campaign conducted against them by the Company and the National Society of Professional Engineers." Possibly as a result, Kassalow feels that any real organizing success will probably come from stronger production and maintenance unions.

University of Wisconsin's labor economist Jack Barbash, who formerly held Kassalow's post with the AFL-CIO, agrees in a recently released paper that engineers and other white collar workers must get used to the idea that their only salvation lies in unionism. Barbash is convinced that, once organized, white collar workers will come to accept traditional union values and tactics. "Once the white collar worker gets over the initial trauma of being in a union, he behaves like a bricklayer," says Barbash.

As an example of what he expects from engineers, Barbash enthusiastically cites the example of the Air Line Pilots Association: "What are they doing? They are engaging in jurisdictional disputes with the flight engineers—an old weapon in Detroit and other places . . . they are calling quickee strikes and wholesale strikes. In short, they are behaving like trade unionists."

Ohio Section Plans Program on Technicians

The Industry functional section of the Ohio Society of Professional Engineers, will present a program on "The Technician, His Work, Education and Status," at the OSPE 1961 convention in Dayton, March 17-18.

Speakers and their topics will be: G. Ross Henninger, president of Ohio College of Applied Science —"The Role of the Technical Institute"; A. C. Friel, chairman of NSPE Committee on Technicians —"NSPE and Certified Engineering Technicians"; Dr. W. G. Torpey, consultant, Executive Office of the President, Office of Civil and Defense Mobilization—"The Role of the Technician"; C. Y. Thomas, chairman of the board, Spencer Chemical Corporation—"Support Personnel for the Professional Engineer in Industry."

Technicians in Ohio Firm Reject Unionization

By a count of 25 to 9, technical employees of consulting engineer Robert J. Schomer of Youngstown, Ohio, rejected representation by the American Federation of Technical Engineers, AFL-CIO. The election was held among Schomer's engineering aides, rodmen, chainmen, inspectors and other technical employees.

In another election the AFTE failed to organize a new technical unit at Minneapolis-Honeywell Regulator Company's Brown Instruments Division, Philadelphia, by a vote of 84 to 39.

Separate units of technical and professional employees at Westinghouse Electric Corporation's X-Ray and Industrial Electronics Division at Baltimore have both voted to retain the Salaried Employees Association as bargaining

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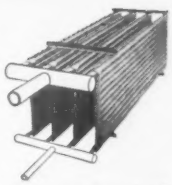

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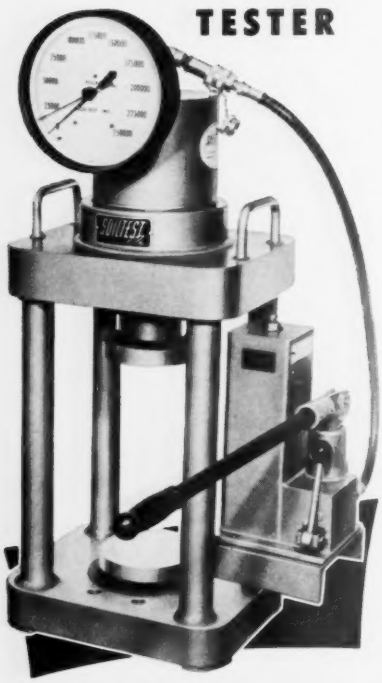

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representative. The union, affiliated with the Federation of Westinghouse Independent Salaried Unions, has represented the formerly mixed units for twenty years. The professionals voted 23 to 22 against inclusion in the nontechnical unit, 25 to 20 in favor of SEA. The clerical-technical unit went for the union 109 to 3.

NLRB General Counsel Stuart Rothman has rejected a pre-hearing settlement between the Board's New York Regional director and the Sperry Gyroscope management on union charges of unfair labor practices in the September decertification election.

The General Counsel threw out the settlement on the grounds that it does not provide an "appropriate remedy" for the company's alleged unfair labor practices. A new complaint must now be issued against the company and hearings held to determine the validity of union charges that the company had instigated the decertification election. The Engineers Association, IUE, AFL-CIO, apparently voted out in September, will continue to hold bargaining rights until a final NLRB ruling on the charges.

Kearns Bill Will Clarify Status of Employed PE

The legal status of professional employee organizations, including sounding boards, would be clarified by a Taft-Hartley amendment entered in the House of Representatives by Rep. Kearns of Pennsylvania.

Strongly supported by NSPE ever since its initial introduction in 1953, the Kearns bill would eliminate the apprehension by some companies that management participation in a sounding board could be interpreted as "interference" or "domination" of a labor organization which is forbidden under the present law. The Kearns bill provides, in part, "that the term 'labor organization' shall not include organizations of professional personnel as defined in . . . this Act if the (NLRB) has not certified or the employer has not recognized a representative as their representative under [the Act]".

Survey Shows Low Pay For English Engineers

Although the median salary of English professional engineers has risen by 32 per cent in the last four years, the figure revealed in a survey conducted by the English Engineers' Guild is still less than half the 1958 median income of NSPE members.

The English survey, conducted among 2,727 corporate members of the Institutions of Civil, Mechanical, Electrical and Chemical Engineers, reveals a median income of $4,413 for the year ending April 5, 1960, as compared with the NSPE median of $10,000 for 1958. The English median was $3,319 for the year ending April 5, 1956.

Latest Endicott Survey of Engineers Is Released

In the face of uncertain business conditions, 210 medium-to-large companies included in a recent Northwestern University survey, report they will hire 5.9 per cent more 1961 engineering graduates, but 3.2 per cent fewer nontechnical graduates than they did in 1960. The over-all demand for 1961 graduates averages out to a "no change" from last year.

The survey, conducted by Frank S. Endicott, director of placement at Northwestern, is the fifteenth annual edition entitled "Trends in Employment of College and University Graduates in Business and Industry."

Although reporting companies expect to pay only $520 per month for engineers compared with an average starting salary of $510 for 1960 graduates, the report notes that, "Experience has shown . . . that competition for the so-called 'top men' tends to force starting rates upward later in the interviewing season, especially for engineers and other technically trained men."

A significant finding in this new survey is that engineering graduates, who formerly were found to lose their salary advantage over other groups after five to ten years, now appear to be keeping their salary lead.

Civil Students Find Uses for Precision Stereoplotter

Cornell University recently put into service the first high precision stereoplotter of its kind to be installed in a civil engineering school in the United States.

The apparatus makes possible the compilation of more precise maps from aerial photographs. Designed to work in microns (1/1000th of a millimeter), the stereoplotter is so precise that a random speck of dust or a hair from the operator's head on bearing surfaces would be apparent, according to Professor Arthur McNair of the School of Civil Engineering.

One of its unique features is that it also can be used to compile from tilted aerial photographs as well as from photographs taken on the ground, and is capable of extending survey control from photograph to photograph along a strip —thus eliminating much of the need for costly and time consuming ground surveys.

The stereoplotter's new electric coordinate printer enables an operator who observes ground points in the photographs in three dimensions to have three coordinate positions computed and printed merely by pressing a button.

Appropriate attachments enable the ground position and elevation above sea level to be put on paper tape or punch-cards—making data ready for subsequent computations with an electronic computer.

McNair said it also will permit more comprehensive research in civil engineering. In addition to many applications to mapping and highway engineering, some other fields in which it will prove of value in making studies are geology, forestry, archaeology, satellites and missiles, cadastral and land surveys, soils, architecture, land planning, and water resources.

The instruction and internal research load will not require the fulltime use of the stereoplotter, Professor McNair pointed out, and it is hoped that Cornell can provide a substantial service to government, commercial and engineering research groups which do not already possess such a precise stereoplotter.

Stevens' Graduates Reach High in Starting Salaries

It looks like a record year for 1961 Stevens Institute of Technology graduates whose starting salaries will probably reach $540 a month, according to Harold R. Fee, director of placement.

Fee's predictions are based on talks with industrial representatives who will begin arriving on the campus February 13th to interview 176 seniors as prospective employees. Some 227 industrial and governmental organizations from New Hampshire to California will take part in the six-week interviewing period.

Beginning salaries for engineers and scientists have been on a steady rise since 1955 when the average was $378 a month, Fee reported. "But industry's standards have climbed, too, and this year it looks like recruiters are going to be more selective than ever. Marks alone are not enough. Government and industry also look for leadership qualities," he said.

Each senior will probably take more interviews than last year when the average was 18 per man, Fee said. "Since Stevens' undergraduates are general practitioners of engineering and science, they're not tagged as specialists by companies. Their versatility opens a number of technological and scientific areas to them."

Interviews terminate before the Easter recess to allow seniors to follow up with plant visits during their vacation.

Business Firms Make More Use of College Courses

Business firms are turning to the campus for ideas to combat recession problems.

That's the observation of Robert Ratner, director of Engineering Institutes at the University of Wisconsin (EI).

Announcing a schedule of 26 institutes for the next five months, Ratner said many companies experiencing recession difficulties are finding it profitable for their personnel to participate in educational seminars. The sessions are valued as sources of new ideas and

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techniques which prove helpful in closing financial gaps.

In response to current needs expressed by industry, EI has planned special sessions in subjects such as cost reduction, quality control and design improvement.

Presenting latest concepts and developments, EI meetings enable enrollees to keep abreast of continually changing technology and conditions, said Ratner.

Institute officials are encouraged by attendance for the first half of 1960-61. "Whereas we anticipated that apparent recession tendencies might cut our enrollment, it has been comparable with last year's record attendance," he said.

Some of the topics scheduled for institutes during the first half of 1961 are traffic engineering, seminar in profit improvement programs for industrial engineers, engineering standards, procedures and practices, as well as refresher courses in mechanical, chemical and metallurgical engineering.

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Space Mechanics Institute Planned by Arizona U.

A new ten-week summer institute in space mechanics for 35 college teachers will be conducted at the University of Arizona from June 12 through Aug. 19. Director of the program is Dr. Manfred R. Bottaccini, U. of A. professor of mechanical engineering.

Bottaccini said the objective of the institute—first of its kind in the Nation—is "to provide opportunity for teachers of mechanical and aeronautical engineering to become proficient in the advanced fields of space technology.

"Despite the current 'space fever,' it is apparent that few schools are prepared to teach space mechanics," the UA scientist said.

The University of Arizona was selected for the National Science Foundation - sponsored program "because it was one of the first universities to offer a space-directed curriculum and a degree in aerospace engineering," Bottaccini said. A $55,200 NSF supporting grant is aiding the UA program.

College teachers attending the space mechanics institute will receive a stipend of $750 plus travel expenses and $150 per dependent. Graduate credit earned in the work may be applied toward Ph.D. or M.S. degrees. Four UA mechanical engineering professors will devote full time to the ten-week institute.

Guggenheim Scholarships Available for Space Study

A nationwide search for potential leaders in rocketry, space flight and other astronautical and aeronautical fields was begun recently by The Daniel and Florence Guggenheim Foundation.

As a result of the research, 18 of the nation's leading young scientists and engineers will be awarded Daniel and Florence Guggenheim Fellowships for graduate study in rockets, jet propulsion, space flight, and flight structures.

These Fellowships will be used for study at the Guggenheim Jet Propulsion Centers at Princeton University and California Institute of Technology and at the Institute of Flight Structures at Columbia University. The Jet Propulsion Centers were established by the Foundation in 1948 to train outstanding graduate students for research and engineering careers in rocket and jet propulsion and aspects of space flight.

The fellowships provide tuition and stipends ranging from $1,500 to $2,000 depending on the level of advancement of the student. They are open to qualified science and engineering students who are residents of the United States or Canada, have outstanding technological ability and leadership qualities, and intend to make a career in rockets, jet propulsion, flight structures or astronautics.

Survey Shows Student's View of Graduate School

A student's eye view of how to get into and through graduate school has just been published by the American Society for Engineering Education. Graduate study is becoming more important in engineering. Not every engineering student should take graduate study, but he should consider the possibility. "The Road to Graduate School" will give him the data to consider that possibility intelligently.

The new publication tells the engineering undergraduate about graduate study and the life of the graduate student. It was published by ASEE's Committee on the Development of Engineering Faculties supported by the Ford Foundation. The new booklet gives the undergraduate a clear, objective picture of what graduate study is like, what its goals are, and what it requires of the student.

"The Road to Graduate School" was prepared by students in the University of Illinois Chapter of Tau Beta Pi and has the student's approach throughout. The aim of the authors was to give information that would apply to graduate study at any accredited engineering school in the United States.

The booklet is being distributed through engineering deans and individual chapters of Tau Beta Pi. It is available free to all undergraduate engineering students.

Anfuso Bill Calls for A National Science Academy

- NSPE Director Is Opposed
- Calls Move Duplication

Representative Victor Anfuso of New York has introduced legislation to increase the number of trained engineers and scientists and to channel these people into Federal employment. The Anfuso bill, H.R. 1, calls for the establishment of a National Science Academy which would provide both undergraduate and graduate education in engineering and scientific fields, but would require recipients of the free schooling to accept Government employment for a time equal to their attendance at the Academy. In order to further strengthen the Government's position with respect to recruitment and retention, the Anfuso measure would also authorize and direct the President to establish a Scientific Career Service in the Federal Government, which would include Science Academy graduates, plus other Federally employed engineers and scientists.

In addition to the training and instruction furnished by the Academy, Anfuso has proposed that the Academy provide a program of scholarships and fellowships under which qualified individuals could receive training at established accredited colleges and universities. These students, like those attending the Academy, would be required to sign an agreement obligating them to accept appointment and serve as civilian employees or commissioned officers in their field of science or engineering for a period equal to their grant.

The details and administration of the Scientific Career Service proposed by the Anfuso bill would be established by Presidential action. Its primary purpose, as set forth in H.R. 1, would be to "place the Government in a more favorable position than it now occupies with respect to obtaining and retaining the quality and quantity of personnel necessary to carry out the scientific, technological and research and development functions of the Government." Anfuso has also cited the need to attract and retain personnel of high caliber, ability, capacity and potential in the engineering and scientific fields, and to offer maximum incentives for such personnel in the form of compensation, career opportunities, prestige of service and other employment benefits.

Paul H. Robbins, NSPE's executive director, said in a statement to the press that while the Anfuso bill clearly recognizes most of the basic problems involving engineering and scientific manpower, its approach toward a solution of these pressing problems would involve unnecessary duplication and expense. "There is no need, as far as we can determine, for the Federal Government to spend time, effort and money to establish an Academy for the undergraduate and graduate education of engineers and scientists," Robbins said. "Our colleges and universities are presently capable of handling considerably more engineering and science students both at the graduate and undergraduate level. A Federally sponsored institution of higher learning would only serve to duplicate facilities, to say nothing of the drain the proposed Academy would have on the already short supply of qualified instructors and professors."

Robbins added that NSPE agreed with Anfuso's recognition of the need for an expanded program of Federally sponsored graduate fellowships at accredited colleges and universities. "But rather than create an Academy as an additional Federal agency to handle this program," he said, "we believe that increased Federal funds in support of higher education could best be used for more graduate fellowship programs to supplement those currently existing under the National Science Foundation and as authorized under the National Defense Education Act."

"The National Society," Robbins said, "supports in principle the Anfuso recommendation that the President establish a Scientific Career Service in the Federal Government. We believe, however, that the Government's competitive position for recruiting and retaining engineering and scientific personnel could be more significantly improved if a separate classification and compensation schedule for these critical categories of employees is spelled out in legislation." Robbins was referring to the so-called Moss-Gubser proposals of recent years which recommended a separate professional schedule and which have been strongly supported by NSPE. Bills along this line have not as yet been introduced in the present Congressional session.

Rhodes Bill Promotes Federal Employee Unions

With the 87th Congress still in its early stages, a virtual host of bills have already been introduced to provide official recognition of Federal employee unions.

One of the chief House sponsors of this legislation is Rep. George M. Rhodes of Pennsylvania. The Rhodes bill (H.R. 12) speaks in terms of "unions of Government employees," which are defined as any organization made up in whole or in part of Federal employees, and which deals with the management of a Government agency as

one of its basic and central purposes. The bill officially grants such unions the right to present grievances on behalf of their members and to have their views solicited prior to the promulgation of new or modified policies affecting working conditions or employment. The bill further provides that when a union represents employees in a unit or specified occupation, the union is to be designated for purposes of collective bargaining, and the government agency must bargain collectively even to the point of signing a written agreement.

Should the union or agency disagree on any matter involved in collective bargaining, either party could invoke the services of the Federal Mediation and Conciliation Service. If this should fail, then the services of a special Government Labor-Management Relations Panel would make a final decision.

A novel feature of the Rhodes bill, included for the first time in legislation of this type, would authorize a monthly union dues check off system for union members. This would be done on a voluntary basis, but if authorized by the employee, the agency would deduct dues, assessments and initiation fees from the employee's paycheck, and transmit these funds directly to the union.

A Senate version of the Rhodes bill has been jointly introduced by Senators Olin D. Johnston of South Carolina and Hubert H. Humphrey of Minnesota (S. 473). Senator Johnston is the influential chairman of the Senate Civil Service Committee. He stated that his bill would bring Federal personnel policies up to date and make them compatible with the 20th century. "It will," he added, "make the Federal service far more attractive to those who presently are in it, and it will also make it far more attractive to those who are eligible to join it and make it a lifetime career." Senator Humphrey declared that the Federal Government must become a model employer in the modern mold. "If we are to enter into an era of 'New Frontiers,' we must make those frontiers available to those who look to us for their livelihood," he added.

Of particular significance to NSPE is the fact that some of the bills exclusively use the term "union," while others would grant recognition to "employee organizations." It is the Society's position that if legislation along these lines is enacted, all organizations, including professional societies, should have an opportunity to present the views of their members on personnel policies, and that this privilege should not be confined exclusively to labor unions.

(Circle 9 in Readers' Service Dept.)

Kefauver Introduces Bill to Establish Federal Department of Science

For the third time in as many sessions of Congress, Senator Estes Kefauver (D-Tenn.) has introduced legislation calling for the establishment of a cabinet-level department of science. The Kefauver bill S. 623, would transfer to the proposed agency current Defense Department activities relating primarily to the development of missiles and rockets not intended as weapons as well as current research programs into the problems of outer space. In addition, the bill proposes the transfer of the National Science Foundation and the Atomic Energy Commission. The measure would also authorize a proposed secretary of science to create such advisory committees on science as are deemed necessary.

In reintroducing his bill, Senator Kefauver declared that "as time passes, the indications become clearer and clearer that we shall never go ahead as we should in connection with matters relating to science until we have some over-all coordination of our efforts. This bill is an effort to achieve such coordination."

Last session, the Senate Government Operations Committee approved a bill sponsored by Senator Humphrey to create a Hoover-type commission to study the feasibility of a Department of Science and Technology and to determine which current activities could effectively be transferred, but the measure died at the end of the 86th Congress.

Meanwhile, the newly formed NSPE Committee on Federal Engineering and Scientific Activities, headed by former Society President, Harold A. Mosher, is preparing a comprehensive analysis and study of all ramifications of the proposed department and related subjects.

Registration Law Called Unconstitutional in Detroit

In what appears to be the first ruling by a Federal court on a state engineering registration law, a Federal District Court judge in Detroit has challenged the constitutionality of both the Michigan and Ohio engineering registration statutes. The main ground for the opinion was that the definitions of "professional engineering" are so vague, indefinite and ambiguous that they violate the due process provisions of both the Michigan and Ohio constitutions, as well as the Fourteenth Amendment of the U.S. Constitution.

The controversy involving the Michigan and Ohio laws arose during litigation between the Modern Engineering Service Co. and the General Electric Co. in which G.E. was being sued in Federal court over a contract dispute. Under the terms of the contract Modern Engineering, at G.E.'s Evandale, Ohio, plant, undertook to design, build, install and prove out certain equipment which was to be used by the defendant in manufacturing jet engine parts for the U.S. Government. Among other defenses to the suit, General Electric alleged that the performance of the contract by the plaintiff constituted the practice of professional engineering under Michigan and Ohio statutes, and that the failure of the firm's engineering personnel to be registered amounted to a violation of the law which would prevent any recovery.

Judge Ralph M. Freeman, in an oral opinion from the bench, refused to hold the contract unenforceable on the ground of nonregistration and denied General Electric's motion for a decision in its favor on this point.

Before turning to an analysis of the respective pleadings, Judge Freeman acknowledged that the work performed by Modern Engineering fell clearly within the definition of "professional engineering" and that "it also seems to the court that the language 'including professional services such as consultation,' etc., would indicate that the services performed by the plaintiff fall within the scope of those terms. . . ."

However, he strongly questioned the meaning of language in both the Michigan and Ohio laws which pertains to the public welfare aspects of professional engineering. The Judge referred specifically to the clause, "wherein the public welfare or the safeguarding of life, health or property is concerned or involved," in the Michigan definition, and to the phrase "are required to protect public health, safety and property," in the Ohio statute. General Electric claimed that these clauses are not limitations on the definition of professional engineering, but are merely legislative expressions of the fact that the engineering registration statutes are based on the state's police power to protect public life, health and welfare. Modern Engineering, on the other hand, contended that these phrases are limitations on the definition, setting forth the requirement of "publicness" of the services rendered.

Judge Freeman agreed that they do constitute a limitation on the definition of the practice of engineering and declared that the meaning of the clauses is impossible to determine because the standard for construing them is not reasonably clear. "The respective contentions of the parties with respect to what is meant by that word 'public' in themselves indicate the uncertainty of the term," he added. "It would be impossible, it seems to the court, for an engineer to determine whether or not he is covered by the statute."

Since engineering registration laws are, in essence, criminal statutes, the Judge noted, they must be strictly construed, thus some meaning must be given to the so-called "police power" clauses appearing in the definitions of "professional engineering." Judge Freeman said, however, that he could reach only one conclusion after listening to the pleadings of both parties: "The definition of professional engineering and the practice of professional engineering by reason of these clauses, which I have referred to as the police power clauses, is so vague and ambiguous that an engineer could not reasonably be required to know whether or not he is covered; in other

Meetings of Note

American Society of Mechanical Engineers—Gas Turbine Conference, March 5-10, Shoreham Hotel, Washington, D.C.; Aviation Conference, March 12-16, Los Angeles, California.

Nuclear Congress—Nuclear Engineering and Science Conference sponsored by thirty major engineering societies and Engineers Joint Council, March 20-24, Chicago, Illinois.

American Society of Photogrammetry—Annual Meeting, March 20-22, Shoreham Hotel, Washington, D.C.

American Congress on Surveying and Mapping — Annual Meeting, March 19-25, Shoreham Hotel, Washington, D.C.

American Chemical Society—National Meeting, March 21-30, St. Louis, Missouri.

American Society of Civil Engineers—Phoenix Convention, April 10-14, Hotel Westward Ho, Phoenix, Arizona.

American Welding Society—Annual Meeting and Welding Exposition, April 18-19, Hotel Commodore, New York, New York.

Society of the Plastics Industries—Annual Conference, April 20-21, Hotel del Coronado, Coronado, California.

National Academy of Sciences—Annual Meeting, April 24-26, Washington, D. C.

American Institute of Mining and Metallurgical Engineers—Southwest Mineral Industry Conference, April 24-25, Las Vegas, Nevada.

words, whether he would be required under the statute to be registered to perform the services in which he may be engaged. Therefore, this court cannot, in justice, apply a harsh rule of unenforceability of the contract here on this ground when the standards of the statute are so uncertain."

After having reached the conclusion that because of the vagueness and indefiniteness of the pertinent provisions neither the Michigan nor the Ohio statutes could be applied to bar the plaintiff's right of recovery, Judge Freeman then went on to say that being so vague and indefinite, the "police power" clauses of the statutes "violate the due process provisions of the Michigan Constitution, the Ohio Constitution and the Fourteenth Amendment to the United States Constitution."

In the course of his opinion, Judge Freeman examined specific exemptions in both laws relating to the engineering design of manufactured products and observed that such exemptions, being in a criminal statute, must be broadly construed in favor of persons who might be subject to them—in this case, Modern Engineering. The Michigan statute specifically exempts "designers of manufactured products for the quality of which the manufacturer thereof assumes responsibility." In Ohio, the exemption provides that registration is not required "for the performance of engineering or surveying which relates solely to the design or fabrication of manufactured products."

In light of these provisions as applied to the responsibility of Modern Engineering under the contract terms, the Judge concluded that the exemption in the Ohio statute is much broader than that in the Michigan law and would cover the services performed by the plaintiff. On the other hand, he said that Modern Engineering is not covered by the exemption in the Michigan statute.

Judge Freeman also had occasion to decide that the Michigan registration law could properly embrace engineering, architecture and land surveying in one statute. Modern Engineering, in arguing for unconstitutionality, had claimed that the statute violated the Michigan constitution which provides that "no one law shall embrace more than one object." To this Judge Freeman replied, "In the broad thrust and scope of the term 'engineering,' it seems to the court that the professions of architecture and surveying are either a part of the broad field of engineering or so closely related to it that to regulate them constitutes only a single object."

The now familiar claim that the laws of both states were unconstitutional because they contained an improper delegation of legislative power to the registration boards was also raised by Modern Engineering. Judge Freeman emphatically disagreed with this contention. "I see no reason or justification for holding that these statutes involve the delegation of legislative power."

Reports indicate that General Electric has obtained permission to appeal Judge Freeman's ruling on the registration issue without having to wait for a final court decision settling the differing contentions surrounding the actual contract terms. (*Modern Engineering Service Company v. General Electric Company*, No. 16081, U. S. District Court, Eastern District of Michigan, Southern Division, December 30, 1960)

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Personalities . . . **Donald E. Shryock** has been appointed field representative for the **Arcair Company** in the mid-western United States . . . **The Austin Company** of Cleveland, Ohio, has appointed **Louis O. Schaefer** as works manager of its Steel Fabricating Division . . . Appointment of **Ralph D. Henderson** as vice president for finance and administration, and **John T. McGraw** as director of engineering for the Vard Division of **Royal Industries, Inc.**, of Pasadena, Calif., has been announced . . . Appointment of **Albert F. Williams** as sales engineer for the **Tann Corporation,** Detroit, has been announced . . . **Frederick J. Zimmermann** has been elected vice president in charge of plants and engineering of **Sterling Drug Inc.** . . . The board of directors of the **Whitlock Manufacturing Co.** has elected **Gordon Bennett** as president of the company . . . **Joel Nelson,** sales engineer, has joined the Kalamazoo office of the **J. N. Fauver Company, Inc.,** of Birmingham, Michigan . . . The election of **Thomas H. Stewart** as vice president in charge of finance of the **Warner Company** has been announced . . . **James R. Miller** has been appointed production manager at **SKF Industries, Inc.** . . . **Alex Cytrynowicz** and **I. Paul Robbins** have been named associates of **Samborn, Steketee, Otis and Evans,** consulting engineers and architects . . . **The Electric Specialty Company** has named **Herbert W. Thode** as general sales manager.

Mr. Shryock

James E. Starr has joined the **Allegany Instrument Company,** Division of Textron Electronics, Inc., as research director . . . **Gene E. Zinniger** has been appointed executive vice president of **Ormet Corporation** . . . **Frank L. Schwartz,** former professor of mechanical engineering at the University of Michigan, has been named director of engineering for Lauson Power Products Division of **Tecumseh Products Corp.** . . . Appointment of **Ralph R. Mendelson** as president and chief executive officer of the **Hotstream Heater Co.,** Cleveland, Ohio, has been announced . . . **Fred J. Knepper** has been appointed vice president in charge of finance for **Autonetics,** a division of **North American Aviation, Inc.** . . . **Special Devices, Inc.,** of Pacoima, Calif., has named **Edgar M. Shurtleff** as director of research and development . . . **Phillip N. Buford** has joined **Page Communications Engineers, Inc.,** as senior staff engineer in the Research and Development Directorate.

Mr. Starr

Joseph R. Tobin has been appointed industrial engineer for the **William Underwood Co.** . . . Appointment of **Edward C. Baker** as district engineer of **The Austin Company's** Chicago district has been announced . . . **H. Zinder and Associates** has named **Frank P. Saponaro** as a vice president . . . The appointment of **Adolph H. Rosenthal** to the newly created post of scientific advisor to the president at the **Kollsman Instrument Corporation** has been announced . . . **Robert J. Phillips** has been named president of **Howe-Baker Engineers, Inc.,** a subsidiary of **Nalco Chemical Company** of Chicago . . . **Robert A. Trumpis** has been elected vice president in charge of manufacturing of **Minneapolis-Moline Company** . . . **Denver Harris** has been appointed special process engineer for **American Potash and Chemical Corporation's** new manganese metal plant at Aberdeen, Mississippi . . . Appointment of **John A. Holbrook,** a specialist in hospital and institutional engineering problems, to the staff of **A. T. Kearney and Company** has been announced . . . **Frank Scholl,** steam engineer at **Wausau Paper Mills Company,** Brokaw, Wis., has retired after fifty years of service.

Mr. Tobin

The appointment of **A. Blake Cornthwaite** as managing engineer for the Atlantic-Gulf Division has been announced by **The Asphalt Institute** . . . **John S. Abel** has retired from his position as manager of the engineering department of **Weyerhaeuser Company,** Tacoma, Washington. . . . **Harrison E. Fischer** has been made an associate in the firm of **Deevy and Shannon,** consulting engineers . . . **Horace Van Dorn** has been elected vice president in charge of engineering for the **Fafnir Bearing Company** . . . **Eugene N. Torgow,** microwave research specialist, has been appointed chief engineer of **Dorne and Margolin, Inc.** . . . **Diehl Manufacturing Company** of Somerville, N. J., has named **Elwood Roger Zeek** and **George J. Abel** as vice presidents in the firm . . . The election of **William E. Kennel** to the board of directors of **Amoco Chemicals Corporation** was announced recently . . . Appointment of **George P. Karas** as assistant manager of the Pak Division has been announced by the **Perfex Corporation** of Milwaukee, Wisconsin . . . **Robert F. Stewart** has been appointed to the position of vice president of marketing of **Gabriel Electronics,** a division of the **Gabriel Company** of Cleveland, Ohio.

Mr. Cornthwaite

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ENGINEERING—

Red China's Bridge to the Future?

First steel bridge ever to cross the Yangtse River stands at Wuhan in central China. Tubular column concrete pouring methods were used for the bridge piers' foundations. Two similar bridges over the Yangtse are planned.

WHATEVER the present state of Communist China's science, there can be no question but that within the next decade or two that nation will be one of the world's scientific giants. . . ."

The source of the above statement is the *New York Times*, one that is generally considered reliable. The subject of the statement, mainland Communist China, is unquestionably one of the most enigmatic factors in the world today. It is equally one of the most threatening. Directly controlling a quarter of the world's population and enough natural resources to be almost entirely self sufficient, China in the past has lacked only a few of the factors which would make it one of the outstanding world powers, among them—organization and adequate development of her available resources.

The problem of organization of the state pertains mainly to population and has been well handled. Under the iron control of the Peiping Communist regime, to say that China is organized is to understate the situation. It is, for instance, unlikely that many other nations in the world could move a million men to or from a given construction project at will. In one dam construction project, however, the Chinese did exactly this. The number of men involved was roughly 20 per cent more than the total population of the District of Columbia.

The stories of the mobilization of China's half-billion population are well known: The great beehive construction projects, the so-called "backyard" steel furnaces, the overwhelming armies of "volunteers" in Korea which offered a battlefield technique as incomprehensible as it was effective against Western opponents. Through a political control that permeates even the family level encompassing the military, social, economic and technological phases of life in China, the Peiping government has succeeded in organizing and directing the efforts of the world's largest single population with an unwavering eye toward making China a world power.

Certainly the odds for reaching this goal are in China's favor. Whether or not the present Chinese government will accomplish all of her goals is highly debatable, but it would be out of step with the times to ignore the fact that China must be reckoned with as a force that will be growing more powerful in the future.

Presently one major weakness in China's structure is technological development. No one is more acutely conscious of this fact than the

Left—Electronic instrument production is handled by former housewives, released from domestic chores by commune living. The Chunshu People's Commune operation shown here is "one of tens of thousands."

Below—Sixty-five ton liquid iron holders being manufactured by workers at the Darien Factory and Mining Wagon Works in northeast China. Holders will be used in iron and steel works in Paotow and Wuhan.

Chinese themselves. Clearly, technological progress is one of the key points in any program to build an international power of a nation. This point could be no more adequately underlined than it has been in the rivalry between Western nations and the Soviet/East European bloc. The very existence of the struggle between nations for technological prowess emphasizes the importance of advanced technology to a nation bent on increasing its power, perhaps to the point of world dominance.

As a result China is presently leveling its sights on vast improvements in its technology. Manpower is being mobilized to this end. Technical information is being collected from every available source. Education is being intensified. All these methods are tied directly to immediate production of equipment, information and industrial progress that will help to pay for the education of the Chinese nation.

As in every other phase of Chinese life, science and engineering operate under unyielding political control. At least for the time being this channelling of efforts has proved profitable, if the information released by Red China can be believed. Unfortunately almost all information available on the state of engineering and scientific progress in Red China is generated by her own propaganda machines.

A group of papers on engineering recently presented to the American Association for the Advancement of Science have proved valuable in making any type of assessment of the profession. By and large these papers represent thorough research of the few technical journals published in China that are available in the West. Although the papers were occasionally supplemented by personal contacts, it must be remembered that any mainland Chinese would be well indoctrinated before being allowed to make contacts with the West.

One example of questionable accuracy is offered by Chinese claims in electronic data processing. According to a paper presented to AAAS by Yao Tzu Li and Way Dong Doo, Chinese newspapers announced in October, 1959, that Chinese engineers had been able to construct a computer that effectively translated Russian into Chinese. Indeed, such a computer would be a major scientific accomplishment! To achieve these results the computer would have to deal with both the Cyrillic alphabet of the Russian language and the roughly 10,000 characters which make up the Chinese language, as well as two entirely different theories of language.

The opinion of an American electronic engineer is significant: "It's generally acknowledged that the U.S. leads the world in computer technology, and we still haven't developed a translator that works. I'd be highly skeptical of their claim. For one thing, they say the machine uses 4,000 vacuum tubes. We haven't used tubes in our machines for years. They simply don't measure up with solid state equipment."

Variations on this same theme probably hold true in more cases than have been admitted. On a broader scale, major recent failures in agriculture and the complete flop of the "backyard blast furnace" program would certainly seem to indicate that a large grain of salt should be taken with most claims coming from mainland China.

Even assuming their accuracy, claims from China for specific technical accomplishments are often misleading. Besides the heavy propaganda element, the society in question is closely controlled and directed. Where the Chinese are tremendously ahead or behind in a given area of technology, it is often a matter of priorities and not abilities. Thus, in the words of L. C. Pan before AAAS, "One has the impression that communist China is fairly strong in the technology of heavy chemicals such as mineral acids and alkalis, but rather weak in that of petrochemicals such as alcohols, solvents and organic acids derived from hydrocarbons, and of high polymers such

as synthetic fibers, synthetic rubbers, and organic films."

Pan points out that although Red China is not richly endowed with oil or natural gas, it has extensive coal deposits which other nations have used to build a petrochemical industry. However, China currently places tremendous stress on iron and steel production. In the last year steel output in China passed that of France, and Peiping claims they will next pass Britain's production of steel. Thus, there would seem to be at least suspicion that coal is going into steel production on a priority basis, while petrochemicals wait their turn.

It is worth noting a pair of specific examples in the chemical industry which might indicate what could be expected from China in the future.

Soviet technicians designed for the Chinese an ammonia plant rated at 50 tons production per day. Once put into operation the plant failed to deliver its rating. Chinese engineers went to work on the problem, realized that the plant was some 5,000 feet above sea level, and that Russian calculations had overlooked this fact. The Chinese proceeded to place a booster in front of the air compressor for the plant which stepped up production by some twelve tons daily.

In another case Russians had specified two operations in tandem to reduce carbon monoxide content in gases. The Chinese found that one of these processes could be eliminated and converted the second operation to the first process raising production 50 per cent.

In these cases the information can be regarded as fairly accurate for in both cases the Chinese simply improved on Soviet equipment to bring it more closely in line with accepted Western standards. However, accuracy is not the main point. In each case the Chinese were readily able to improve on the Russian designed equipment with which they were working. In this light it is significant that within the last year some 12,000 Soviet technicians in China packed up and went home. From the most optimistic standpoint this has been regarded as an indication of a Moscow/Peiping falling out, but it would be perhaps shortsighted to overlook the other possibility that such Soviet aid was no longer needed.

It seems clear that raw material for an effective engineering profession exists in China. Quoting one man who spent five years as an unwilling guest of the Chinese, "They are among the most inventive people in the world." From their "firsts" in gunpowder and rocketry there is a Chinese tradition of scientific discovery. Like so many other resources available in the nation, it is simply a matter of developing the engineering profession.

In the ten years since the Communists took over mainland China, industrialization has been one of the single most important goals of the nation's leaders. Tremendous effort has gone into industrialization and from their relatively low starting point some statistically impressive results have been achieved.

To compare Chinese and Western standards without considering the basic differences between the two civilizations would be misleading and inaccurate. For one thing any serious industrialization in mainland China is relatively new. While a few hesitant steps were taken under Chiang Kai-shek to bring industry to China, it was not until ten years ago that anything approaching an all out effort was made. One measure of this is that those plants and mills introduced by Chiang Kai-shek are still in use and in some cases provide major portions of current production.

China's industrial aims are purely and simply to build industry. Not economical industry, and not efficient industry, but industry for its own sake. Chinese journals give evidence of this attitude. After considerable study of these journals, L. C. Pan told the American Association for the Advancement of Science that in chemical engineering, "The considerations of economy and efficiency seem to have been ignored. But economy and efficiency are two of the fundamental principles of all branches of

Cutting tools are manufactured in Northeast China by the Harbin Tool Plant. Aim of this production is to build up China's machine tool industry. Heavy reliance on foreign machine tool supplies is being replaced by methods such as these.

Chinese Claims in Mechanical Engineering . . .

1. **World's third largest producer of coal.**
2. **World's sixth largest producer of steel.**
3. **Discovery of a large deposit of nickel, unknown before 1950.**
4. **Designed hydroelectric stations of 1000 megawatts capacity, and thermal power electric stations of 450 megawatts capacity.**
5. **Produced 72,500 kilowatt hydroturbine generators.**
6. **Produced complete steam power plants up to 50,000 kilowatts output.**
7. **Has in operation a 7000 to 10,000 kilowatt heavy water type experimental reactor, the largest in Asia.**
8. **Extensive studies on fuel cells.**
9. **Made high speed electronic digital computers with speed of 10,000 operations per second.**
10. **Testing of Chinese-made jet planes completed in 1956.**
11. **Produced transport planes for civil aviation at the end of 1957.**

(Compiled by E. K. Nieh, Ebasco Services, Inc.)

engineering. . . .This, then, points to the basic fact that economy and efficiency in Communist doctrine are quite different from economy and efficiency as we know them."

The point is well taken, but equally true is the fact that major gains in efficiency in most industrial processes have come after the process itself is fully developed. It is hard to imagine efficiency being introduced into a given industrial process before the process itself has been mastered. The same applies to the economy and is especially true in a nation where some 18.5 per cent of the gross national product can be plowed back into development of the economy.

A second factor stemming from the low starting point is a sort of "earn while you learn" brand of engineering education. This is shown in two ways. First, engineering students in China spend a great deal of their time working in practical rather than theoretical situations. According to Li and Woo, "It is apparent how the close tie between their education program and education is wrought. The students of Tsing Hwa University virtually have their own production facility where they have designed and built some special automobiles and broadcasting stations and the like. . . . The Chinese objectives are more toward production than are our research activities, and they have much more emphasis on student participation than we have."

Further, in working with Russia, an industrial plant will be built by Chinese engineers in Russia under Soviet supervision, then dismantled and shipped to China where it is rebuilt. The aim is both to speed construction and to provide basic knowledge to the Chinese, along with insight to the planning that must go into such a project.

In training their engineers, the Chinese have one marked advantage over the Western nations. They are in the enviable position of being able to decide how many engineers they will need at a given point in the future, so simply start training the proper number of students with enough lead time to meet the need. Obviously, this means that supply and demand will tend to balance ahead of time and adequate engineers will be on hand when needed.

So far, what have the results been? Industrial output is six times what it was in 1950. Machine tool output is up 45 times. Steel output has come from less than a million tons in 1950 to a projected 18 million tons this year, passing steel production in France. In many other areas the results are as startling and there can be little doubt that tremendous strides will continue to be made.

But there is another side to the coin. Can the Chinese engineer continue to work effectively under the all-pervasive political control that exists in Red China? Will the drastic reinvestment rate from the gross national product continue to sustain itself? Will the lack of economy and efficiency begin to make itself felt? Will force-feeding work on what is basically and traditionally a professional class of men?

The answers to these questions will have much to do with the industrial, technical and economic future of mainland China. At the rate of present development, the answers will have to be found in the fairly near future.

To this day many peasants in China are still waiting for the introduction of the steel-tipped plow, and are still living in a nation where the prime means of locomotive power is the ox. In spite of a backlog of Western technology on which to draw, China is probably facing the biggest job of limited-time industrialization the world has yet to witness. With the drive that is being given to industry and technology in China, progress is bound to come. And in large part, its eventual success or failure will be measured by the success or failure of China's engineering profession.—End.

Credit

Illustrations accompanying this article, including the cover photo of construction on the Yangtse River Bridge, were supplied by Eastfoto, New York City. The caption material was also supplied by Eastfoto and has not been factually altered.

Under the Communist regime, the shape of the land is changing. On the left, female surveyors prepare the way for a multi-purpose major water conservation project in the Lungyang Gorge. At right, bulldozer teams level the ground ahead of construction work on the Lanchow-Sinkiang Railway. The railway covers the distance from Kansu Province to Sinkiang, the westernmost province of China.

FROM WASHINGTON

BY
MILTON F. LUNCH,
N.S.P.E.'s Legislative Counsel

Eisenhower's Farewell ►

Only history will decide the enduring value of any statesman's commentaries, but it has been suggested already that President Eisenhower's "Farewell Message to the American People," may rank with George Washington's Farewell Address and Lincoln's Second Inaugural. One portion in particular has evoked high praise from both sides of the political schism, and this portion is of direct concern to the nation's engineers and scientists:

> "In this revolution, research has become central; it is also more formalized, complex and costly. A steadily increasing share is conducted for, by, or at the direction of the Federal Government.
>
> "Today, the solitary inventor tinkering in his shop has been overshadowed by task forces of scientists in laboratories and testing fields. In the same fashion, the free university, historically the fountainhead of free ideas and scientific discovery, has experienced a revolution in the conduct of research.
>
> "Partly because of the huge costs involved, a Government contract becomes virtually a substitute for intellectual curiosity. For every old blackboard there are now hundreds of new electronic computers.
>
> "The prospect of domination of the nation's scholars by Federal employment, project allocations and the power of money is ever present—and is gravely to be regarded.
>
> "Yet, in holding scientific research and discovery in respect, as we should, we must also be alert to the equal and opposite danger that public policy could itself become the captive of a scientific technological elite.
>
> "It is the task of statesmanship to mold, to balance and to integrate these and other forces, new and old, within the principles of our democratic system—ever aiming toward the supreme goals of our free society."

◄ Nuclear Testing

Possibly the sort of situation the former President had in mind in referring to the danger of public policy becoming the captive of a "scientific-technological elite," was exemplified by the open dispute during the election campaign between Thomas E. Murray, P.E., and several eminent scientists. Murray, a former member of the Atomic Energy Commission and a distinguished engineer, has long contended the United States should resume underground nuclear testing. Several scientists, including Dr. Jerome B. Wiesner, science adviser to President Kennedy, were highly critical of Murray's stand. Apropos of the Eisenhower warning was the comment by Professor I. I. Rabi, a member of the President's Science Advisory Board, that Murray was "not technically qualified to discuss such questions." Murray said the criticism "apparently means that, since I am not a nuclear physicist, I am incompetent to discuss the issue of public policy with regard to the development of nuclear technology. This is an absurd and arrogant judgment." The point of the dispute is not whether the tests should be resumed, but rather, whether public policy which today so often rests upon complex technological considerations shall be determined solely by those technically expert in the subject matter. If so, the President, his Cabinet, and the members of Congress might as well take a permanent holiday.

Increase in Technicians ►

The Department of Labor expects that during the next 15 years employment will increase at least as fast in technician occupations as in engineering and the sciences—more than doubling in 1975. The chief factor in the rising employment of engineers, scientists and technicians, the Department says, is the increasing complexity of industrial and military technologies and the vast increases in expenditures for scientific and engineering research and development.

Approximately $9 million will be provided for the training of highly skilled technicians under the National Defense Education Act in the current fiscal year, according to the U. S. Office of Education. Some $7 million was provided in the fiscal year ending June 30, 1960. The program is operating in more than 300 schools.

An advisory panel of educational experts to the USOE favors continuing the technician training program, but suggests Congress authorize a broader definition of technician occupations necessary to the national defense. The group also recommended that the NDEA student loan program be specifically extended to full time students in accredited public and private nonprofit two-year post high school technical institute programs. An AFL-CIO official of the advisory body entered a dissenting note, favoring removal of the present language of the law restricting the program to training for "highly skilled technicians." The labor groups would like the funds made available for an extension of existing vocational training programs, including apprentices in skilled trades and crafts. On the other hand, authorities in technician training would like to tighten the program and revise or add to it so that it applies to high level technician training as a function of higher education. The current program is mainly conducted by public school officials.

◄ Assistant Commerce Secretary

Secretary of Commerce Luther H. Hodges will ask Congress to approve an additional Assistant Secretary of Commerce for Science and Technology. The new assistant would supervise such technically related Commerce functions as the Weather Bureau, Coast and Geodetic Survey, Bureau of Standards and the Patent Office. Another unspoken factor in the picture ties in with current proposals to take all or some of the above functions away from the Commerce Department and place them in a department of science. Having a science and technology assistant in charge of such activities may be considered a further argument against the transfer idea.

Demand for Scientists ►

A further plea for more emphasis on engineering and scientific graduate work has been sounded by Alan T. Waterman, director, National Science Foundation. In the Foundation's Tenth Annual Report, Dr. Waterman said: "For the past several years the national output of scientists and engineers with graduate degrees has remained substantially constant. Since the curve of national research and development effort continues to rise, the conclusion is easy to draw. We are now failing to meet the increasing demand for qualified professional scientists and engineers we require to achieve the research and development goals of the country, much less to meet world competition in modern technology."

A section of the report dealing with scientific manpower adds there is a need for better information on numbers and professional characteristics of engineers in the National Register of Scientific and Technical Personnel. It now lists only about 20,000 engineers throughout the Nation.

A recent report of a joint congressional committee on defense production echoes Dr. Waterman's comment about the importance of graduate personnel, noting the small number of students receiving Ph.D. degrees in technical fields. Several government agencies have now awarded contracts for interdisciplinary programs at qualified universities and it is expected that this type of activity will be expanded. Much more may be heard in the near future about interdisciplinary studies in connection with proposals to provide more Federal assistance for graduate work.

PERHAPS one of the hardest working assignments any member of NSPE can receive is that of vice president. In contrast to many organizations where the vice presidents have few specific responsibilities, the constitution and bylaws of NSPE outline detailed assignments for them, and in addition, other activities may be assigned them from time to time by the president or by the Board.

Basically, vice presidential responsibilities fall into three categories. As a member of the Executive Committee they are responsible for the general review of policy and administration of the entire Society. Since the Board meets only three time a year, the Executive Committee has the responsibility of policy decisions between Board meetings.

A second responsibility is as a liaison between the officials of the Society and the area from which the vice president is elected. While each vice president is an officer of the entire Society, in order that there be geographical representation on the Executive Committee and to be certain that there is an officer in each of our six major areas, vice presidents are nominated and elected from each region.

The third responsibility is for the direction, administration and stimulation of certain committees. The bylaws have divided the activities of the Society into six logical groups. Four of these groups deal with programs and two deal with administration of the Society. The program areas are *professional development, professional employment, professional relations,* and *public relations.* The administrative areas are *organizational functions* and *policy functions.* In each of these areas there are four to eight committees dealing with well defined activities.

In addition to these duties, the vice presidents, of course, are frequently called upon to represent the Society at various functions in which their particular position may best prepare them for Society contribution.

Unfortunately, I have found in contacts with the membership that few members realize both the quantity and scope of the work expected by the Society from its vice presidents. I am delighted that these men have taken time to briefly outline the activities and functions of their area of committee supervision. I sincerely hope this series in the AMERICAN ENGINEER will be another step in informing NSPE's membership of the effective organization working for them at the national level.

NOAH E. HULL, P.E.

The above introduction by Noah E. Hull, P.E., as president of NSPE opens a series of articles which are intended to inform the membership of the many activities and responsibilities of . . .

NSPE'S VICE PRESIDENTS

Vice President John H. Stufflebean, P.E., Reports on the

PROFESSIONAL RELATIONS GROUP

"LET'S face it . . . I'm prejudiced!" was the reaction which came to mind as I mused over the six departmental areas of Society intertest in an effort to arrive at an interesting résumé of the current activities of the committees in the Professional Relations Group.

The Engineering Technicians Committee is the most aggressive, active, pioneering committee within the group, perhaps within the entire Society. Two years ago the Board of Directors established this committee after recognizing a great need in the profession to understand, consider and attempt to initiate some constructive plan or program which would accommodate this most important facet of engineering science field. Chaired by A. C. Friel, the Engineering Technicians Committee (ETC) has "taken the bull by the horns" and formulated a dynamic program in this field.

An article entitled "Institute Recommended to Certify Technicians," appeared in the October, 1960, issue of AMERICAN ENGINEER explaining the many activities involved. Though a multitude of time and work has been required

to conceive, promote, organize, legalize and implement this visionary ideal, the end physical result will be "The Institute." This national certificating body shall be known more accurately as an "Institute for the Certification of Engineering Technicians and Certified Engineering Technologists." The Institute shall be independent of NSPE. It shall be comprised of eight professional engineers appointed by NSPE and eight certified engineering technologists appointed by a society of engineering technicians. The three grades of engineering technicians in order will be:

- Engineering Technician Trainee;
- Engineering Technician;
- Senior Engineering Technicians.

Only time will tell how far sighted and progressive this action will be to the future of our profession.

The Ethical Practices Committee, chaired by Howard Honefenger, is currently formulating a program to achieve the long pursued uniform telephone listing, following a meeting of the NSPE and A T & T officials this past July. This committee also has under current consideration (a) Board of Ethical Review Case No. 60-2, which involves competitive bidding and (b) coordinating action with American Institute of Consulting Engineers, Consulting Engineers Council, EJC, ECPD & NSPE to review the advertising practices of certain large engineering organizations.

The Board of Ethical Review, chaired by Pierce Ellis, has several cases under review. It is awaiting recommendations from the Ethical Practices Committee on Case No. 60-2 in order to proceed with this case on competitive bidding. It is this Board's function to review actual or hypothetical circumstances submitted by state societies or those arising directly at the national level. It is contemplated that the cases and the "findings" as reviewed by this Board will be combined into a case book for future documented reference and information on specific ethical matters.

The Interprofessional Relations Committee, chaired by Arthur Miller, is currently engaged in improving relations with the American Institute of Architects particularly in reference to a suggested program of state level collaboration to resolve Architect/Engineer differences. Hopes for the coming year are for increased cooperation and exchange of ideas on mutual problems with the American Bar Association and the American Medical Association.

The fifth, and as the old cliché goes "last but not least," committee in this group is that charged with accomplishing *unity* in our time. This subject, probably more thoroughly discussed at the individual member level than any other matter in the history of NSPE, is moving forward inevitably to ultimate consummation through the patience, diligence, persistence, and dedication of our Inter-Society Relations Committee, chaired by Past President Garvin Dyer. Their work with dedicated individuals in the other principal engineering organizations or societies is truly a labor of love and devotion.

The fall of 1960 found this committee most active on many fronts. Most of this activity resulted from the public announcement made by the Past Presidents Task Force on Unity of the Engineers Joint Council that its recommendation on unity of the profession be implemented immediately. It is believed that NSPE, through its policy of inviting observers from the Founder Societies to be our guests at Board meetings, has contributed in some small way to a better understanding and appreciation of each others' desires and problems. Through the continued persistent efforts of the Inter-Society Relations Committee, unity is nearer today than at any time in the history of our profession.

These, then, are the national committees which are charged with the professional relations of our Society. Attention of each member, chapter officer and state officer is directed to the August issue of the AMERICAN ENGINEER for the full membership of all national committees as well as their addresses. Remember these committees exist solely to serve our profession.—**End.**

Left—The NSPE award for Industrial Professional Development was established in 1960 as a step toward encouraging the improvement of the engineer's status, as well as the profession's relations with industry.

Right—Vice President Stufflebean as seen at the recent meeting in Des Moines with A.C. Friel who reported on the progress of the Engineering Technicians Committee.

Vice President R. King Rouse, P.E., Reports on the

PUBLIC RELATIONS GROUP

APPRECIATION by the public of good performance is the measure of good public relations—we are all familiar with that definition. But, to achieve our goals most efficiently we must direct varied efforts to the most specific and principal publics. The role of good public relations with all of the publics is a big one if all the needs and objectives of the professional engineering society are to be realized.

A large portion of our budget is now spent, directly or indirectly, toward making friends and influencing opinions, so our primary objectives can be more easily accomplished if we have a good, long range PR program. Obviously all of our plans cannot become effective to the same degree at the same time. We must name our prinicpal objectives and give the ones with highest priority some action in proportion to the amount of money allotted by the NSPE Board.

In listing our publics it is not necessary to attempt to show them in order of their importance. It is conceivable that priorities can become obsolete as matters of greater interest within the profession take on new and different meanings.

If we attempted to name and discuss each public the list would probably include the nine groups which follow.

Members—The first one on our list is certainly the most important of all the Society's publics. It is also the one on which the greater part of our PR budget is now spent. Like most expenditures in the field of advertising it is very difficult to determine how effectively the money is being spent. It's a hard thing to measure, but we do know that spending this money is effective when we count the increasing numbers who have retained active membership year after year.

Until we stop and take inventory, it is difficult to remember all of the surveys, bulletins, news reports, periodicals and many other pieces of written communication that are supplied to members on a regular planned schedule. Even movies are produced to acquaint the new and the old member with facts concerning the Society, its officers, headquarters and other facets which should be better known.

An individual member's opinion of the Society must be based on what that member knows about the Society. Therefore, it is of great importance that he be supplied with information as complete and as current as possible.

PE Nonmembers—To maintain the phenomenal growth which we have experienced we must continue to sell the registered but nonmember professional engineer.

We want every qualified registered engineer to be a member of our Society and participate in its work. Yet, we must insist on certain moral and ethical standards to be in the criteria which each member uses before he proposes the name of a prospective member.

Again, there is already available a multitude of printed pieces which can show and tell the story of the Society's benefits to qualified individuals. It is no task, in person to person contacts, to convince the right man that he is a "debtor to his profession."

Nonregistered Engineers — To preach registration is inherent in the concept of the philosophy of this Society. A good PR program must include some of the advantages of registration with aids for the man who needs to be guided down this path. Every state and possession now has a registration law which every person who practices engineering therein must obey. Here is a fertile field for us to use hard selling to gain new members; here is the future of the professional engineering society.

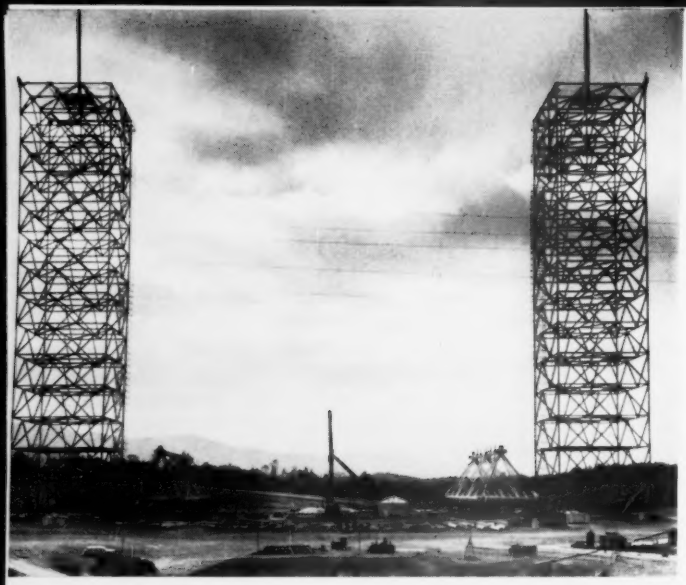
Engineering Students—Our effectiveness in using PR with our student public should begin early in high school. Some believe even in the kindergarten. At any age, an appropriate program can show the opportunities of an engineering career.

Career clinics, when properly timed, can do much in guiding the students to a selection of courses that will lead to basic preparation

(Continued on page 55)

Displays such as this one which was done in connection with a past Engineers' Week, assist in the Society's program to build a favorable public image of the professional engineer.

Navy's Sugar Grove Radio



THE evil spirits who sometimes haunt engineers must have thought this one up on a blue, blue Monday.

One can almost imagine the way the planning session must have gone:

First Fiend: "If we're going to give them fits, it must be big. Let's make it the world's biggest—about the size of Yankee Stadium."

Second Fiend: "That isn't enough. Let's make them build it in the remotest, most inaccessible spot we can find."

Third Fiend: "We can make them move a few hills to put it up. What about tolerances?"

Second Fiend: "Oh, thousandths of an inch for a start. But as fine as they can go beyond that. I think all we need now is a finishing touch."

First Fiend: "Easily done. We'll put it on wheels."

Top left — Already standing are these two 42-story work platforms. These will be torn down once the actual radio telescope is completed. Clouds obscure the top of the tower in the rear.

Center left — From the bottom looking up this is the way the work towers appear. By the time this man is finished the painting job on the dish he will be able to look down on the towers from a height of well over 600 feet.

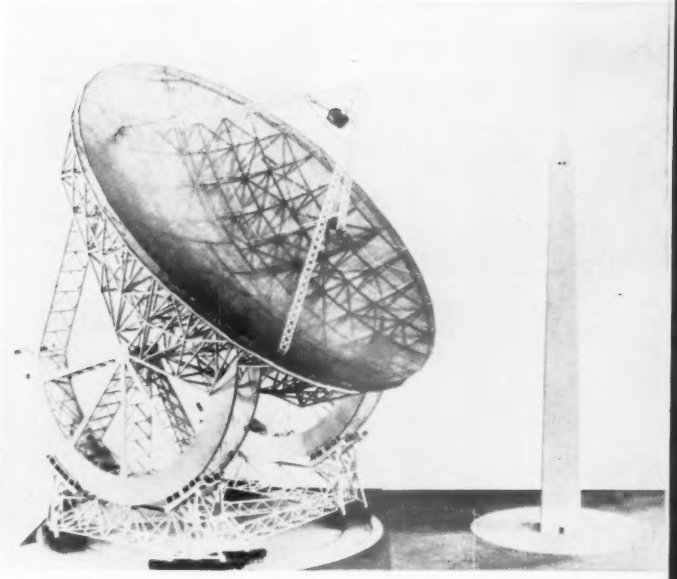
Bottom left—A million and a half cubic yards of earth were moved to clear the site for erection of the mammoth radio telescope. Inner circle will carry rails on which the big dish will rotate.

Below—This structure will serve to support the mammoth dish when finally erected. Both the dish and the substructure will turn a full 360 degrees on railway trucks, making the dish the world's largest moving steel structure.

Telescope—

Space Station in the Wilderness

An AE Photo Story



This scale model shows how the big dish will look after completion. A model of the Washington Monument made on the same scale is dwarfed by the mammoth structure.

Fantasy? Not at all. It is more likely that the originators of the idea were engineers themselves, and no more malicious than they actually had to be to get a tough job done. The project in question goes under the misleadingly innocent nickname of "Sugar Grove." Once completed it will be the world's largest movable radio telescope. In fact, it will be the largest known movable landbased steel structure in the world. Taken one at a time, it will fill each of the qualifications—or hazards—outlined above.

After completion sometime in 1964, the United States Naval Radio Research Station at Sugar Grove, West Virginia, will represent one of the most difficult engineering tasks ever undertaken, as well as one of of the most important steps forward in this country's exploration of outer space. The tasks outlined for the mammoth structure are to gather radio signals from some billions of light years into space, to help plot the routes of the first astronauts, to track and communicate with natural satellites and stars across the skies, and to offer a basic research tool not available anywhere else in the world.

Obviously such results are not easily accomplished. In this particular case, at first glance it would seem that the designers had tried to make the engineering job as tough as possible. The location for the big dish had to be remote to eliminate any outside radio interference. To solve this problem Navy scientists needed a site removed as far as possible from any semblance of industrialized civilization. Thus, they went to the outskirts of Sugar Grove (population 33) in the wilderness hills of West Virginia.

At such a location many of the facilities which might otherwise have made the job easier simply weren't available. The nearest convenient rail head is at Petersburg, West Virginia, some fifty miles away by switchback mountain road. Because of the radio interference offered by a busy highway, the roads leading to the radio telescope installation are neither the busiest nor the best in the world. The last mile and a half of road leading to the site had to be constructed from scratch.

Roads can become a serious problem in such a large project. The pintle bearing on which the structure will turn is the largest ever cast. Its shaft weighs 116 tons, measures some ten feet in diameter and better than fifteen feet in length. To safely transport the telescope to its proper site every road bridge along the route had to be reinforced and painted with exact guidelines for the truck to follow.

An interesting point of contrast is that in spite of the gigantic size of the telescope, the bearing had to be machined to four-thousandths of an inch and covered by a specially constructed aluminum shed, all of which must be "practically vacuum cleaned" periodically.

Like a do-it-yourself project, preparation is about 80 per cent of the job. In this case, however, the preparation step alone was bigger than many entire jobs. Even before the site was selected two fully independent surveys were made on the entire eastern seaboard looking for the remotest possible location where all scientific demands of the job could be met. Once the site was selected, extensive research, testing,

Top left—First work has begun on one of the biggest jobs involved in building the dish. This painter has a long way to go—when completed, the total paint bill will cover some 250 tons of paint and the labor of putting it on.

Center—In charge of the project is C. O. "Slim" Edmonds, of U. S. Steel's American Bridge Division. All steel fabrication and construction has been subcontracted to American Bridge.

Bottom left—Fabrication of the dish has already begun, as shown here. Target date for completion is 1964. About one fourth of one of the working towers appears in the background. Note man standing at base of tower.

exploration and investigation covering everything from meteorology to geology went into full swing.

With the actual site fixed, a 60-foot radio telescope was built as a further check against radio interference in the area. Steps taken by the Navy to shield its own electrical equipment are one measure of the importance of the interference phase of the operation. All such gear within a two mile radius of the antenna will be buried underground in specially constructed subterranean laboratories. These laboratories will have walls about two feet thick lined with coke, and entrances and exits similarly protected. Coke, which is lower in cost, was chosen as the liner rather than copper because of the size of the job.

To prepare the site and to bury the nearby laboratories, over a million and a half cubic yards of earth have been moved—mainly tough, stubborn shale. The Navy has movies of construction work showing a steam shovel working in the excavation—when the shovel is dropped, it simply bounces. Further, to insure a solid foundation, the Navy has banned any blasting to loosen the rocky soil.

The reason for the ban is summed up by one Navy official: "When we lay the actual foundation and the rails on which the dish will move, we are going to carry accuracy as far as we can go. We will certainly try for thousandths of an inch, and even finer measurements if we can."

What exactly will this fantastically precise foundation have to support? About 30,000 tons of steel structure, 600 feet in diameter set up to rotate on two axes—a full 360° horizontally and almost 180° vertically. From another viewpoint the foundation will support a seven-plus acre wind-catching sail made of aluminum mesh. Height of the steel structure will be equivalent to a 65 story building, or 20 per cent taller than the Washington Monument. If you happen to be a painter, measure it by the 250 tons of paint to be used on the completed antenna.

To build this Gargantuan creation, Navy has already had its contractors put up a pair of working towers, each 42 stories high with a 200 foot crane at its topmost point and moving on rails. Total cost for the project is about $100 million, which figures out to about a dollar and a quarter per pound for the dish itself.

Range for the radio telescope will be measured in billions of light years. Comments one Navy official. "On a clear night we should be able to see a man inventing a wheel."

On a nonstatiscal level, there are a number of other things involved worth noting. Certainly the project is a fine monument to the cooperation of the scientist and the engineer in getting a job done. Also, it marks a major step forward in the Nation's scientific prestige. No other nation in the world has anything that even compares in size or scientific effectiveness. Finally, the finished radio telescope will represent a major achievement for the engineering profession, in overcoming a set of problems and technical barriers that would seem to have been leftovers from a nightmare.—**End.**

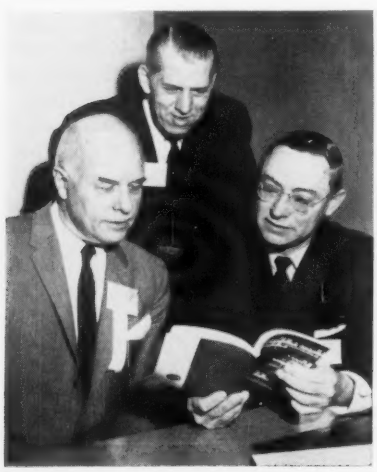
Professional Climate in Engineering

College and industry representatives during a discussion period on the University of Cincinnati campus.

An AE Report on the 13th College-Industry Conference, sponsored by the Relations with Industry Division of the American Society for Engineering Education and the University of Cincinnati.

A SEARCH of the literature for the definitive history of the engineering profession from its origins in the mists of early technology to the space-poised second half of the 20th Century suggests that such an achievement in creative scholarship has yet to be realized. When and if it is, there will surely be no more significant aspect of this historical presentation than the tracing of the growth and development of the engineer as a practicing member of a recognized profession.

It was to add another chapter in the engineer's Prometheus-like wrestling with the problem of professionalism that the 13th College-Industry Conference addressed itself last month in Cincinnati. There were the usual talks, discussions, luncheons, and more talks. There were harsh and unflattering words about how industry and education are doing in cultivating their respective acreages for a harvest of true engineering professionalism. There were stewardship accounts given of measurably successful programs for professional growth and development in industry, a Federal agency, and a consulting firm. But perhaps the import of the Conference could be best heard in the overtones of concern expressed by the participants regarding the vital nature of the concept of professionalism to the continued functioning of industry—and engineering—as the exotic and ever more demanding challenges of the Age of Technology are faced.



Looking over a copy of NSPE's booklet, *Professionalism in Industry*, are Hugh L. Rusch, vice president, Opinion Research Corporation; Paul H. Robbins, NSPE executive director; and Eric A. Walker, president of Pennsylvania State University, and president of ASEE.

One Conference speaker, Stanley Learned, chairman of the executive committee of Phillips Petroleum, expressed the practical need for professionalism in a Q&A form:

"Why does Phillips place great emphasis upon developing professionalism among its engineers and scientists? Our chief incentive stems from the primary purpose of a business organization. This is to get maximum earnings consistent with service to the public from the savings of the owners while at the same time protecting and improving their investment. To attain these business objectives we must have a capable team of creative technical people who are themselves spurred on by incentives which emerge directly from development of a climate of professionalism."

John J. Healy, Jr., of Monsanto Chemical, and president of the American Institute of Chemical Engineers, pointed to the practice of engineering as "essential to the growth and profitability of industry. . . . The engineer is the communicating link between public anticipation of the changes in standards of living to be brought about by scientific discoveries, and public realization of these discoveries in the form of useful products . . . so of all the professions, engineering is the one that is primarily concerned with improving the standard of living."

The theme or objective of the Cincinnati Conference was succinctly put as:

> **To develop a definition and philosophy of professional behavior, to describe and explore the characteristics of the professional man, and to learn from people with successful experience in the field of professional development what they and their organizations have done.**

A paper delivered for Professor J. Morley English, research vice chairman at UCLA's Department of Engineering, gave a definition of professionalism which was settled on by the Committee on Professional Climate of ASEE's Relations With Industry Division: "The conscious attitude of associates and management, integrated to stimulate and encourage increased intellectual capacity, moral integrity, acquisition of experience, and effective application of skill and knowledge in the conduct of work—with due regard for service to society and the enhancement of the profession."

There was considerable agreement among the conferees as to what professionalism is and is not. The disagreements appeared to center around the variety of approaches to the problem of how professionalism in engineers is best encouraged. For example, Mr. Learned argued, "The company can take certain action to create and maintain an atmosphere conducive to professional awareness and development. But the real push to be professional must come from *within* our technical people. It seems to me that it is vitally important that professionalism be taught first in the colleges before it can catch on as it should in industry."

However, Eric A. Walker, ASEE president, and president of Pennsylvania State University, held that the colleges "are not the ones to teach professionalism." In a talk at the concluding luncheon, Dr. Walker emphasized the "impossibility of lecturing 20-year-old students on ethics and professionalism in general."

A summary of the characteristics of a professional environment in an industrial operation involving engineers was given by Mr. Healy as:

- The establishment of titles which clearly differentiate the professional scientist and engineer from the subprofessional personnel;
- The provision of lines of advancement based on technical competence in addition to the avenues of promotion in supervisory positions;
- The provision of adequate tools and facilities for the conduct of professional work, including adequate stenographic and clerical assistance;
- The encouragement of professional development through the study of current technical literature, the participation in technical society activities including attendance at technical meetings, and where practical and appropriate, attendance at advanced university courses;
- The emphasis by management of the individual nature of professional work and of the importance attended to professional contributions made by individuals to the success of the enterprise;
- The suitable recognition, preferably of an ap-

(Continued on page 36)

What Is Being Done To Foster Engineering Professionalism

Three Case Histories

The Navy's Bureau of Yards and Docks—From a Conference Report by Capt. Lloyd E. Root, USN: Legal limitations on the number of Naval and civilian engineering employees, and the limitations of the Military and Civil Service pay schedules place many obstacles in the way of handling some 20 billion dollars worth of shipyards, air stations, supply depots, hospitals, power plants, and the like. Hence engineering productivity and the climate of engineering professionalism are considered extremely important. Navy's over-all program to achieve this atmosphere of professionalism includes: On-the-job training requirements for all junior officers, and encouragement for all officers and civilian employees to enroll in graduate work; all incoming officers receive post graduate education to Master's degree level, and payment of tuition for graduate courses and short courses is made for many civilian engineers; active participation in professional and technical societies (NSPE included) is encouraged at the local and national levels; expenses paid for engineers delivering papers at society meetings; all officers, engineers and architects are strongly urged to obtain registered professional engineer or registered architect certificates through state registration; prominent display of professional registration certificates; administering an active engineering research and development program; a continuing program to revise specifications and guide engineering designs, using outside firms where needed; conferences with field personnel; sponsorship of symposiums with industry leaders; publication of a monthly magazine, *The Navy Civil Engineer;* operation of a 12,000-volume technical library, which receives 150 professional magazines and journals per month; sponsorship of a series of lectures by outstanding scientists and engineers; conferences with field personnel to exchange ideas and keep up to date, with separate meetings for engineers in the various branches; and the publication of a series of monthly articles devoted to one technical society, giving information on its organization, objectives, activities, meetings, etc.

Captain Root is assistant chief of engineering for the Bureau of Yards and Docks. He believes the Navy's efforts should increase in the areas of education, professional society work, and professional registration. "I believe that the effort which promises the greatest return is that directed toward the individual engineer to foster in him the thought that the engineering profession is a dynamic one, that we want him to grow with it, and that the best jobs haven't been started, the best work hasn't been done."

Captain Root

Mr. Learned

Mr. Jagger

Phillips Petroleum Company—From a Conference Report by Stanley Learned:
Phillips was selected to receive the NSPE 1960 Industrial Professional Development Award. Efforts on behalf of maintaining a climate of professionalism include in-plant instructional programs for engineers and training programs which subject the engineer to many phases of his department's engineering work; assistance for the publication of technical papers and for the presentation of such papers to technical groups; encouragement for engineers to join technical societies and participate in society activities; recognition of engineers as part of the management team and the advising of engineers on matters which will affect their current and future status as supervisors or managers; the urging of engineers to become registered under state laws and the providing of time off with pay to those required to take registration examinations; payment of all costs of engineers for initial registration as well as for registration seals and renewal fees; the provision of stenographic, clerical, drafting and other services to the engineer in sufficient amount to allow him to do his work promptly and efficiently; the maintaining of a reference material library for each department; a periodical performance report on each engineer, made by supervisors, which considers the engineer from both work performance and personality standpoints, and the oral review of an engineer's over-all performance and progress by a supervisor; the use of the most modern electronic computers for engineering work; a formal salary plan based on job evaluation; appropriate lump sum rewards for patentable ideas; a separate division devoted exclusively to technical personnel; and a high level engineering standards committee, and an engineering and construction committee.

Mr. Learned, chairman of the executive commitee and assistant to the president at Phillips, maintains that he is "particularly proud of the spontaneous efforts of our engineers to develop themselves professionally." He believes the company can take certain actions to create an atmosphere conducive to professional awareness and development, but the "real push to be professional" must come from within the engineer. "Phillips looks for demonstration of real professional development, as it has been observed many times that the more professionally oriented the engineer, the better his work and attitude." In evaluating engineering jobs, Phillips gives special consideration to certain areas of difficulty and the importance of the job to the company. The resulting salary levels, or job grades, are then readily comparable with other professional occupations within and outside the company.

Arthur D. Little, Inc.—From a Conference Report by James M. Jagger: A private consulting firm offering research-based services to clients in industry and government, Arthur D. Little has 1,400 employees, of which half are professionals. The firm believes that the most important single factor which creates the proper professional climate is a high degree of individual responsibility. The individual in charge of a client's project is called a case leader. The latter is a seasoned, professional man who can handle a project from start to finish; can review a proposed assignment with a prospective client; can assemble a team with appropriate professional training and experience; and can provide the leadership for conducting the research, writing and delivering the final report. Titles are held to a minimum, and are used only for purposes external to the organization. The firm's professional development program includes: A tuition refund program for college level evening courses, and time off during the day to attend classes for which the individual pays his own tuition; graduate and undergraduate level courses, without college credit, offered at the company; a seminar program for senior members to discuss the nature of the firm as a business and as a professional consulting organization; company-sponsored research; an internal review of professional work in journal style; informal presentations of work by staff members during noon hours; an incentive compensation and profit-sharing plan in the form of quarterly payments reflecting company earnings and a discretionary yearly bonus.

Mr. Jagger, vice president and personnel director of Arthur D. Little, holds that "there is no substitute for a high caliber professional staff in providing a professional environment. Men who are active in professional societies, are publishing professional papers in the leading journals, and are widely known for their professional work, will insist on and maintain a professional climate." The Arthur D. Little management attempts to take a sympathetic and helpful viewpoint toward its engineers without creating in the professional man a feeling that he is being controlled or regulated. Mr. Jagger stresses his firm's attempts to avoid diluting the efforts of the staff and impairing their roles as independent professionals. "If the engineer gets the feeling that through controls and checks on his work someone else will take the burden of assuring that a professional job is done, we will have destroyed a key element in the professional climate." The man in charge of a client's project at Arthur D. Little "must feel that the responsibility for the success of that project rests on him exactly as though he were an independent consultant with his own shingle out."

"To develop a definition and philosophy of professional behavior, to describe and explore the characteristics of the professional man . . ." From the theme of the College-Industry conference.

Conference Proceedings

Complete proceedings of the 13th Annual College-Industry Conference of the Relations With Industry Division of the American Society for Engineering Education are available through the University of Cincinnati at $5 per copy.

propriate public nature, of outstanding individual accomplishment; and

- Adequate compensation.

In the discussion sessions, people in both education and industry asked questions which sought to bring out specific details of the programs which Phillips, the Bureau of Yards and Docks, and the Arthur D. Little consulting firm had for bringing about an environment for professionalism. The details varied in the three programs, but the general approach as described was quite similar: Give the engineer the basic opportunity for professional growth and he will make good use of it.

The question of engineers and unionism in relation to professionalism in industry was brought out in several papers at Cincinnati. As Mr. Healy saw it: "The sole aim of individual professional development is not protection against unionization. Its basic purpose and the basic purpose of a professional climate is to provide an environment in which the individual can develop and exercise his skill to maximum advantage. Fundamentally, the engineer recognizes that he has little to gain and possibly much to lose by placing his economic and professional fate in the hands of a collective agency. The professional climate which provides him with opportunity to utilize his skill, with proper recognition of the value of it and its accomplishment, will confirm this belief."

In a paper entitled "Professionalism and Unionism" Timothy E. Shea, vice president, engineering, Western Electric Company, specified that "where engineering unionism exists, it cannot but be injurious to engineering ideals and engineering effectiveness." Mr. Shea traced the development of engineering union activity at Western Electric. "There were," he said, "many in upper management who supposed that since engineers are reasonable people, the engineering union would continue to be a reasonable, constructive one. But bargaining led to controversies, and these to the taking of emotional positions. Then changed leadership and changed attitudes of leaders due to new ambitions progressively developed among union leadership strong antimanagement attitudes."

In commenting on the election held last May at Western Electric, in which the union lost by a vote of 3,970 to 2,603, Mr. Shea observed that "I think the most important factor in this election was the determination the company had displayed, the action it had taken, and the policies it had announced, evidencing its search for improved engineering conditions. These included improved salary administration, personnel appraisal practices, a vertical classification plan, clear cut separation of professionals and nonprofessionals, engineering personnel units, and the like."

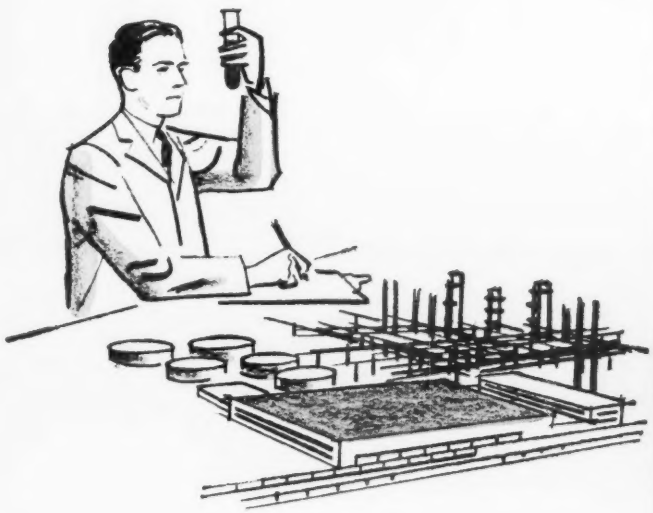
Summarizing the Western Electric experience, Mr. Shea stated that looking back, "Our position is as follows: Engineering unionism and true professionalism are incompatible. Engineering unionism is detrimental to the interests of both the engineers and the company. These results come about in two ways: First, through the course of evolution of the union's character, as epitomized by the history of the Western Electric union; second, through the intimate and damaging effects which divisive tactics have on teamwork which is particularly vital to engineering work, and on the performance of individuals. No matter what the motives of engineering union leaders may initially be, as controversies arise in bargaining they are likely to be led into personal attacks on supervision. The union leaders defend themselves by asserting that supervision is blind, short sighted, ill willed or conspiratorial. These adjectives fairly state the character of many assertions that have been made."

Mr. Shea pointed to the vital nature of teamwork to professional and managerial people. "I know of no first rate institution whose professional and managerial people do not believe enthusiastically in that institution, have trust in one another's integrity and competence, and achieve through teamwork what as individuals they could never achieve. The engineering unions attack that teamwork by attacking the integrity and competence of the institution and its supervision. Those of us

(Continued on page 51)

Timothy E. Shea, vice president, engineering, Western Electric Co., and Leighton Collins, ASEE executive secretary, discuss professionalism.

Professional Profiles



E. C. Gaston, P.E., of Birmingham, Alabama, contributes to the worlds of today and tomorrow by combining engineering with atomic energy research and development.

When the age of atomic power comes into its own there is at least one engineer in the country who is going to be more than ready to meet it. If past performance is any indication, E. C. Gaston, P. E., of Birmingham, Alabama, is going to be in the forefront of the progress that will be made when the great atomic energies are released for profitable commercial use.

As a matter of fact, E. C. Gaston has already begun to lay the groundwork for his place in the new age. He is a director and member of the Executive Committee of Atomic Power Development Associates, Inc., a member of both the executive and the technical and engineering committees of High Temperature Reactor Development Associates, Inc., and a member of the executive committee and the board of trustees of the Power Reactor Development Company.

Besides the immediate preparation Gaston has to offer to the new age his past experience spans 35 years of fruitful engineering studded with honors and outstanding achievements. The most recent and most distinguished honor Gaston has received is the George Westinghouse Gold Medal Award from American Society of Mechanical Engineers for "distinguished leadership in generating station design and operation in the development of a major power system."

Power has been Gaston's business as an engineer ever since he first went to work for the Dixie Construction Company in June, 1923. On this first job Gaston worked with steam plants, hydro plants, power distribution substations and many of the other phases of mechanical engineering involved in providing public power. During the ensuing years Gaston became a registered engineer in Alabama, Mississippi, Georgia and Florida, which just about blankets the Southeastern United States.

Not in the least does this engineer confine his engineering to office hours. Gaston is an active participant in engineering societies and organizations in his community. A listing of his affiliations gives an idea of the extent of his efforts: president of the Engineers Club of Birmingham; chairman of the Engineering Council of Birmingham and Jefferson County; American Society of Mechanical Engineers; former member of the Prime Movers Committee of Edison Electric Institute; and, of course, NSPE.

Active in community affairs, Gaston is also a member of the Optimist Club, Vestavia Country Club, Birmingham's Southside Baptist Church, The Club, Inc., and the Downtown Club. Gaston, who was born and attended high school in Mobile, Alabama, subsequently graduated with a degree in mechanical engineering from the University of Alabama.—**End.**

By

GEORGE F. DOWNS, JR., P.E.

Phillips Petroleum Company

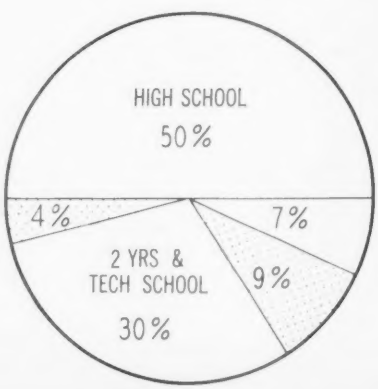
Developing Professionalism Among Engineers in Industry

The Phillips Petroleum Company was selected to receive NSPE's first annual Industrial Professional Development Award as the organization which has shown outstanding achievement in adopting and implementing progressive, professional employment policies for its engineering personnel. In this article Mr. Downs outlines many of the specifics in their program. On page 33 of this issue is a report of the recent College-Industry Conference of the American Society of Engineering Education in which another Phillips employee relates his views on the subject.

IMPROVED use of nonprofessional personnel has enabled engineering and scientific employees of Phillips Petroleum Company to devote a greater percentage of their efforts to solving problems and producing the technological advances required to remain successful in the highly competitive petroleum and petrochemical business.

Phillips employs approximately 24,100 individuals of which 3,060 are engineers or scientists. The part of the company with which this article is directly concerned is made up of about 350 people of which approximately 150 are engineers and 200 are nonprofessional personnel. This group, the Design Division, is engaged in engineering development work on a company-wide basis; in the design of refining and chemical plant facilities, pipeline systems, service stations, storage and distributing facilities for liquefied petroleum gas and ammonia, and numerous special building projects. The Division also handles land surveying and mapping, and performs patent, chart, and illustrative drafting services on a company-wide basis.

An example of what has been accomplished in utilization of nonprofessional personnel to relieve engineers exists in the Design Branch of our Division. This Branch employs approximately 250 people. It has responsibility for producing construction plans and specifications for company capital improvement projects. In 1951 this group was made up of two-thirds (68 per cent) engineers and one-third (32 per cent) nonprofessional personnel. Today the make-up of our Design Branch has changed to less than one-half (46 per cent)



This diagram shows a breakdown of the educational background of nonprofessional personnel. Though none hold degrees in any field of engineering, half show some college background, and all are high school graduates.

The far left photo shows a typical drafting room under 1951 conditions. Engineers (designated by the letter E) and draftsmen alike occupy drafting tables. Under present conditions, shown left, the engineers each occupy separate desks.

engineers and 54 per cent nonprofessional personnel.

With the increase in engineer-supporting personnel, engineers actually are able to accomplish more engineering than they did under the 1951 basis. They are not only more productive but better satisfied.

Accomplishing a change in personnel make-up of this kind requires extra supervisory and training effort from top management of the company on down. Obviously not every nonprofessional individual is qualified to handle work formerly performed by engineers. Also, there have been clerks, typists, draftsmen, and technicians supporting engineers since the beginning of the profession. The effort to more effectively use nontechnical personnel must be directed toward identifying those jobs customarily thought of as engineers' duties but which could be handled by trained nonengineers and then training the nonprofessional people to do the work. They must be taught to do the work without an excess of instruction or supervision from the engineers.

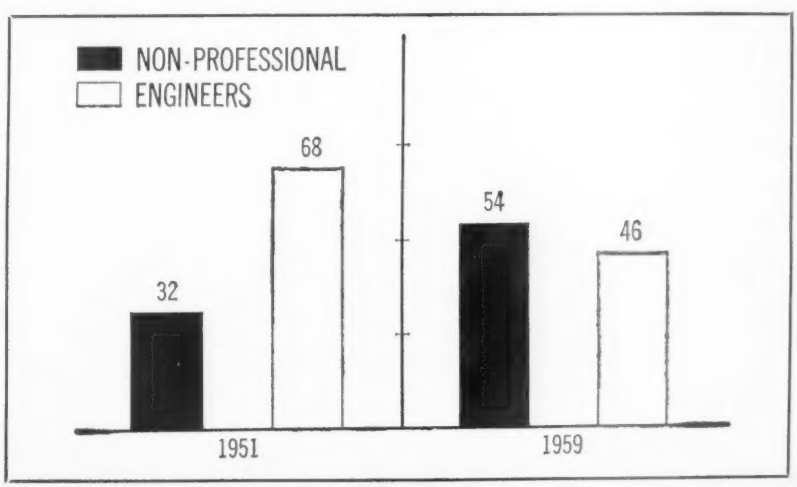
In the Design Division, 90 per cent of the engineers are registered professional engineers in some state. Incidentally, Phillips pays the registration fee, annual renewal, and buys the seal for any engineer who becomes registered in the state of his choice.

Thirty-three of our nonprofessional personnel in the Design Division have received what might be termed "pre-employment training." They are graduates of two state operated technical schools. Our company cooperates with eleven other companies, five of which are oil companies in a drafting advisory committee. This committee advises the school faculties of the current needs and techniques of their companies and these are injected into the curricula. Instructors are furnished copies of drawings, standards, models and other material which would aid. Talks are given to students by experienced draftsmen. Students are given such benefits as awards of merit and field trips to the various industries' operations. Naturally, this type of training eliminates much orientation and indoctrination when the graduate enters employment.

About 80 per cent of our nonprofessional group in the Design Division supporting its engineers are draftsmen, drafting supervisors and projects design draftsmen. The balance are clerks, technicians and model builders, illustrators, surveyors, land description computers and rodmen.

The educational background of these nonprofessional personnel varies. Fifty per cent of them have had high school only, seven per cent have had one year of college, thirty per cent have had either two years of college or two years of technical school training. Four per cent have had three years of college and nine per cent have a college degree in a field other than engineering.

On entering employment, nonprofessional employees in the draftsman category are provided with a book of standards and instructions on routine procedures. The standards relate to the field to which the employee is assigned; viz., architectural, electrical, map-



The graph at right shows how the ratio of professional to nonprofessional employees has changed during the eight year period from 1951 to 1959.

ping, etc. The new employee is urged to study these standards and be able to apply them directly to his work. He can, for example, design pipe supports, railroad crossings, insulation, ladders and platforms, steam trap installations and a myriad of other repetitive type facilities by reference to standards with the approval of his supervisor. There are approximately 400 standards relating to design of petroleum facilities now in existence in our company. A large percentage of the items covered by such standards were at one time designed on a custom basis by engineers.

Nonprofessional employees who elect to pursue drafting can progress, if qualified, to quite responsible positions. One or two of our former draftsmen have, by examination, become registered professional engineers. Such jobs exist as supervising design draftsmen and project design draftsmen. The men in these jobs are capable of handling some project design engineering functions, subject to review by our design engineers. The project might include piping revamp jobs and LPG distribution installations which involve many components covered by standards.

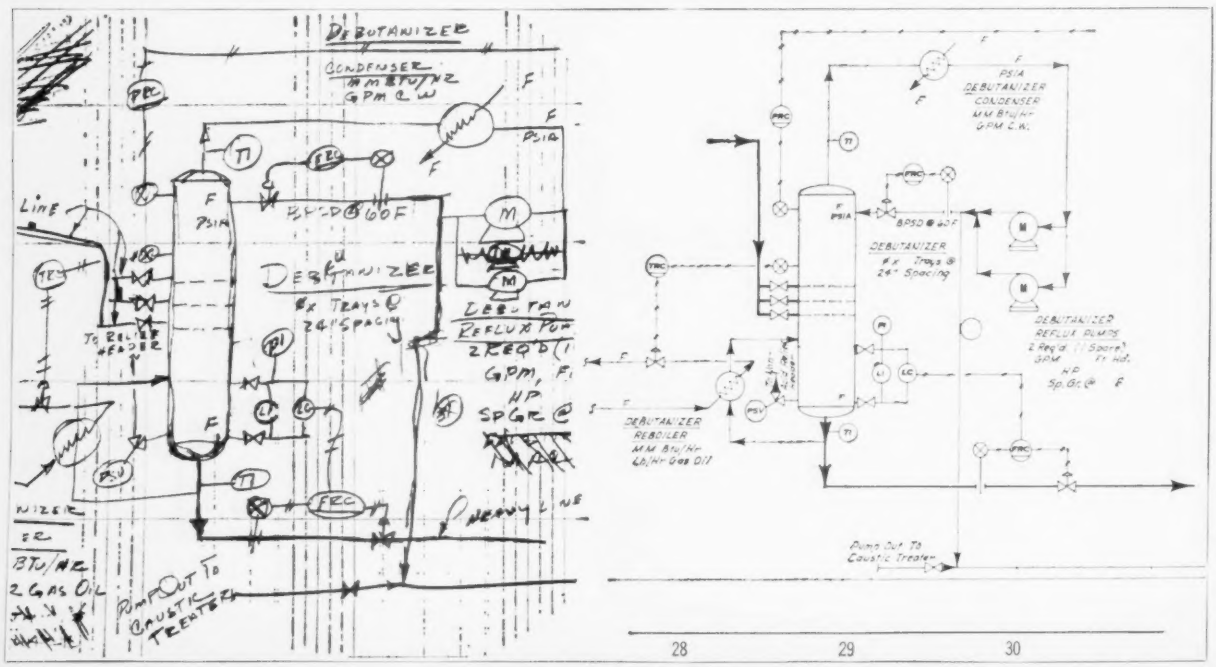
In a large petroleum and petrochemical company, piping design is an important part of the business. Determining pipe sizes was one of the more time consuming jobs formerly handled by engineers. Procedures have been developed which enable nonengineers to perform a high percentage of this work. Additionally, the computations for expansion and contraction stresses in piping formerly consumed many tedious hours of our engineers' time. By standardizing the configurations of flexibility components in piping and programming the computations for the computer, our nonprofessional people handle much of this work. The same is true to a lesser degree in connection with bid analysis on heat transfer equipment. Here again, some of the more routine computations can be handled in their entirety by nonprofessional employees. Two more examples of areas formerly occupied by engineers are:

- The computation of gauge tables for horizontal, cylindrical tanks. Formerly, for one tank table, the calibration in gallons or barrels versus liquid height in inches to the nearest quarter required approximately 40 hours of an engineer's time plus the time of nonprofessional people checking the accuracy of typing of the completed work. Currently, the tank measurements are entered on a form by a nonprofessional employee. This form is transcribed by another nonprofessional employee for machine application, then fed to a computer which computes and prints the completed gauge table. The entire operation requires approximately two hours.

- Complex pipeline hydraulic studies are performed by our engineering development group. Roughly 20 per cent of these computations are now done by nonengineers, subject only to review by their supervisors.

The design of petroleum and petrochemical plants requires extensive process engineering, usually performed by chemical engineers. The results of this work are shown on process flow sheets. Many of these flow sheets formerly were drawn by process engineers. Draftsmen were sometimes employed to trace and letter the completed sheets. Much of the drafting formerly handled by process engineers

This before/after reproduction of a data flow sheet shows how the draftsman, following the specification sheets supplied to him, can transform an engineer's rough draft into a final drawing, eliminating much of the time-consuming paper work which cuts into an engineer's productivity.



Experience at Phillips has shown that a group of clerical employees with proper supervision can be trained to effectively relieve the engineer of much routine work without detailed instructions on every job.

has been reassigned to technicians and chart draftsmen who have been trained on flow sheet work. They are able to prepare complex flow sheets from the most sketchy basic information. At times, fundamental data for flow sheets is now furnished in the form of tabular information accompanied occasionally by rough free hand sketches. Decals are used for most of the equipment normally encountered in petroleum process and petrochemical plants.

Technicians and draftsmen are also trained to convert tabular information to charts and graphs relieving the engineers of tedious plotting work. The chart draftsmen are frequently able to recommend the most effective manner of presentation.

Patent draftsmen are capable of producing finished patent drawings from verbal descriptions or rough freehand sketches. Earlier inventors were forced to prepare more detailed drawings with the patent draftsman simply copying or fancying up the drawing in the manner prescribed by the U. S. Patent Office.

Much design work consists of changes and additions to existing plants. In earlier years an engineer would visit the plant to verify the accuracy of existing drawings and make measurements on existing equipment and pipe to be revised. The results of this work were reflected on resurvey sketches or revised drawings. Current procedure has eliminated the necessity of engineering personnel handling the field work on a majority of the more straightforward plant modification projects. By means of field measurements, oblique photographs from the ground and aerial photographs, design draftsmen are able to handle this type of detail, leaving the engineer available for equipment design, selection, layout studies, and other work of greater importance.

Trained clerks are utilized on many jobs formerly handled by graduate engineers. The effort to enlarge the scope of their work is being continually emphasized. Initially engineers were provided with clerks. The burden of instructing these clerks in the work they should do was the responsibility of each engineer. Frequent complaints were received from the engineers that the time required in instruction was greater than the time saved by delegating the work to clerical personnel. The solution to this problem was the key step in maximum utilization of clerks. After a few false starts, we were able to establish a small clerical group headed by a well trained supervisor who possessed enough engineering background to recognize those areas where clerks could relieve engineers. The clerical section was then expanded as additional duties were delegated to it. The clerical supervisors instruct the clerks and perform the training in the role of assisting engineers. A list of the duties formerly handled by engineers but now performed partially or entirely by clerical personnel follows:

- Make material lists from construction drawings
- Handle requests for reproduction
- Maintain files and print racks on jobs
- Maintain drawing indices and drawing ledgers
- Dictate numerous routine transmittals
- Prepare project schedules and progress reports for engineers' approval
- Prepare equipment control sheets, equipment indices, parts lists, drawings, and operating instructions
- Prepare door schedules, window schedules, conduit schedules, reinforcing schedules, etc.
- Prepare job data books
- Handle time sheets, time records
- Maintain catalog reference material in the drafting room
- Assemble, follow routine approval, and issue drawings
- Expedite foreign prints

In our experience the key aspect of an effective clerical group has been supervisors trained to recognize work they can effectively perform to relieve engineers of routine

(Continued on page 54)

About the Author . . .

Mr. Downs

George F. Downs, Jr., P.E., a native of Bartlesville, Oklahoma, graduated from Stanford University, California, in 1932 with a degree in engineering. He was employed by Phillips Petroleum Company in 1933 after a year's service with the Texas State Highway Department and became manager of Design Division, Engineering Department in 1946.

A registered professional engineer in Oklahoma, Colorado, and Nebraska, he has served as a director of the Oklahoma Society of Professional Engineers and is a past president of the Bartlesville Engineers Club.

In addition to professional activities, is chairman of the Water Resources Committee of the Bartlesville Chamber of Commerce, director of Arkansas Basin Development Association, chairman of YWCA Advisory Committee and a member of the Independent Petroleum Association of America.

New Literature

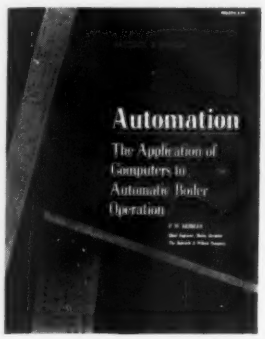
STEEL HANDBOOK—"Three Keys to Satisfaction," a 77-page revised guide to combining sound design principles, proper selections of steels and good treatment to achieve optimum economy and material performance is now available from Climax Molybdenum Company, a division of American Metal Climax, Inc. Separate sections on design, steels and treatment, amply illustrated with tables and charts, contain basic information which make it possible for fabricators to increase the endurance limit of properly selected steels fivefold when good heat treatment practices are applied and increase the endurance limit of properly selected steels tenfold when both sound design principles and good heat treatment are combined. The steel section deals mainly with heat treated alloy steels used at tensile strengths below 200,000 psi, and does not include steels such as the high strength low alloy structural, stainless or tool steels.

(Circle 15 in Readers' Service Dept.)

PLASTIC PARTS—This is the first detailed study of the factors that determine when to mold and when to machine a plastic part. The study reveals there is no fixed quantity above which molding is cheaper than machining, or vice versa. Breaking even point between the two processes varies according to part size, contour, tolerance and material. Machining may be cheaper than molding in runs of up to a million. On other parts, molding may be cheapest in runs as small as 100. A six-page booklet reveals specific breakdown points for ten different categories of thermoplastic parts. It presents five illustrated case histories of actual production parts (in nylon, Teflon, Delrin and styrene), costed out for both molding and machining. The study lists eleven factors which may raise or lower the molding breakdown point. Some general rules for calculating the breakeven point are given.

(Circle 16 in Readers' Service Dept.)

AUTOMATED BOILER OPERATION—A definitive, attractively illustrated study of the current status and



future of boiler automation is contained in bulletin G-101, "AUTOMATION," released by the Babcock & Wilcox Company. Written by G. W. Kessler, chief engineer of B&W's Boiler division it was originally presented as a paper to the 1960 ASME-AIEE Power Conference. Copies of bulletin G-101 are available upon request.

(Circle 17 in Readers' Service Dept.)

LETTERING SET—A 6-page, color folder is now available from Keuffel & Esser Co. to describe its new, economy priced 8935 "Doric" (R) Lettering Set. Illustrations include photographs of each of the seven pieces of the lettering set, and of their wooden carrying case. Also shown are samples of the letter faces and sizes that can be drawn with the 8935 Doric. In addition to the standard capital letters, symbols and numerals, the set includes the complete lower case alphabet in three popular sizes: 100-, 140-, and 240-inch. These letters may be formed at any slant of as much as 22½ degrees from the vertical by simple adjustment of the scriber arm.

(Circle 18 in Readers' Service Dept.)

MICROWAVE COMPONENTS—Microlab has made available a new catalog of microwave components. This catalog consists of 72 pages and includes detailed descriptions and specifications of their line of coaxial attenuators, filters, power dividers, terminations, crystal mounts, tuners and other coaxial microwave components. A large amount of space in this catalog is devoted to design sections for each product which present technical information of a general nature to assist the design engineer in the section of the proper component. Also included is a special article on "The Application of Matrix Algebra to the Design of Microwave Networks."

(Circle 19 in Readers' Service Dept.)

AEROSPACE—The Aerospace Corporation, organized last summer to assist the Air Force in the scientific and engineering planning and direction of its missile and space programs, has recently published a 20-page booklet explaining its role in the defense of the Nation and in international affairs. Fully illustrated with pictures of major staff members as well as some of the more important projects, the booklet outlines the purpose of the organization, plans for the future, background, and discusses briefly some current projects.

(Circle 20 in Readers' Service Dept.)

NEWSREEL FILM SERIES—A new motion picture titled "Concrete in The 60's Report No. 1," has been released by the Portland Cement Association. The film, a continuation of the newsreel issued annually since 1957, highlights outstanding construction projects, new events and new applications of concrete during the past year. Among the interesting sequences shown in this 23½-minute film are projects which will help create a new face for America in the decade ahead. This interesting project highlighted in "Concrete in the 60's Report No. 1," make the film suitable for both

technical and nontechnical audiences. Sixteen millimeter prints are available on loan through any of the Portland Cement Association's 35 district offices located in major cities of the United States, including Hawaii, and Vancouver, British Columbia.

(Circle 21 in Readers' Service Dept.)

DIE CASTING—Up-to-date, key pointers for producing sound zinc alloy die castings, and the various factors that make this possible are contained in the new third edition of "Die Casting with Zinc Base Alloys" just published by Henning Bros. & Smith, Inc. The handy 36-page booklet with numerous photographs covers such vital topics as alloy composition, alloy and die temperatures, casting and venting, injection pressure, surface finish, as well as basic rules for machine and die care. A separate chapter is devoted to "How Improper Casting Techniques Affect the Part."

(Circle 22 in Readers' Service Dept.)

AIR FILTER BULLETIN—A new 8-page bulletin issued by Farr Company describes the redesigned Farr V-7 Roll-Kleen Air Filter. Illustrated are

the four models which offer a choice of automatic drive or manual operation for advancing the media across the face of the filter, similar to the action of the film-loading device in a box-type camera. Design considerations of construction, ease of installation, ready access, replacement of media roll and high reliability are discussed. Photographs and sketches highlight important features and show how multiple units may be assembled together to handle large air volumes up to almost any requirement. Technical data includes dimension drawings, capacity tables, instructions how to select the proper unit for the service, and an explanation how to order.

(Circle 23 in Readers' Service Dept.)

STEEL "SPEC" CHART—Peter A. Frasse & Co., Inc., has announced the availability of a new chart, Sec. D, No. 1, with which alloy steel government specifications can be easily identified. Compiled by Frasse Technical Service, the chart shows the chemical analysis requirements for the more widely used military, Army-Navy aeronautical and Federal alloy steel specifications. Also listed are specified forms (sheets, bars, tubing, etc.) and nearest corresponding SAE, AISI and AMS numbers. The chart is printed on durable card stock, 8½"x11", and tabbed for ready reference. With it alloy steel users will save valuable time normally lost checking through individual "specs."

(Circle 24 in Readers' Service Dept.)

ELECTRON BEAM WELDING—Air Reduction Sales Company has just made available reprints of an article by the Messrs. E. J. Greene, R. R. Banks and R. M. Niedzielski, titled "A New Electron Beam Welding Unit." The article was delivered as a paper before the American Welding Society convention in Los Angeles, April, 1960, and appeared in the August issue of the *Welding Journal*. Complete with graphs and illustrations, the article provides complete background information on the process. Following a general discussion of the apparatus, the three basic elements of the electron beam welder—electron-optics systems, power supplies and vacuum systems are presented in detail. A final section reviews the electron beam welder's welding characteristics.

(Circle 25 in Readers' Service Dept.)

CONSTRUCTION BOOKLET—Contract awarding authorities from private industry and from all levels of govern-

ment are quoted as supporting the single contract method of construction in a new brochure published by the Associated General Contractors of America. Titled, *Save Construction Dollars with America's Basic Construction Methods, The Single Contract System*, the brochure states that about 95 per cent of federal contracts and 35 per cent of the states' use the single contract method, as well as the overwhelming majority of local government and private contract awarding authorities. It is pointed out that not only do owners save money, but that responsible and capable subcontractors gain under the single contract system because without the general contractor providing the necessary coordination, there are frequently costly slowdowns. Copies of the booklet were sent to engineers, architects, private companies, and members of Congress and governmental agencies. Individual copies are available without charge.

(Circle 26 in Readers' Service Dept.)

SOILTEST BULLETIN—A new four-page bulletin on new types of laboratory equipment is available from Soiltest, Incorporated. Among the items illustrated and described in the bulletin are a mechanical laboratory mixer, a balanced mechanical shaker, infrared drying ovens, mechanical mortar and pestle sets and a salt spray fog corrosion test cabinet.

(Circle 27 in Readers' Service Dept.)

These listings are informational only and are not an endorsement of the products, nor of the manufacturer's claims. To receive any of the new literature described in these columns, merely circle the item number in the Readers' Service Dept. and mail to AMERICAN ENGINEER.

NSPE Des Moines Meeting Brings Action from Board

Positive action and the resolution of divided opinions were the characteristics of the 1961 Winter Professional Meeting of the National Society of Professional Engineers Board of Directors held at Hotel Fort Des Moines, Des Moines, Iowa, February 9-11.

Meeting jointly with the Iowa Engineering Society, the NSPE Board discussed and acted upon issues ranging from military pay scales to the certification of engineering technicians. Among the actions taken were:

- Approval of governing documents for creation and operation of an "Institute for Certifying Engineering Technicians;"
- Approval of a series of future actions to enhance the position of the engineer in the military services;
- Endorsement of the Junior Engineers and Scientists Summer Institutes (JESSI) program currently held at a number of universities throughout the country;
- Defeat of a move to reconsider the previously approved 1960 NCS BEE Model Engineering Registration Law approved at the 1960 fall meeting of the Board; and
- Selection of sites for 1963 meetings of the Board of Directors.

A sampling of one or two of these issues gives a good idea of the way the over-all meeting went. Submitted with the report of the Engineering Technicians Committee were two recommendations for Board action: First, that the Board approve documents creating an institute for certification of engineering technicians; and second, a change in terminology to call top-ranking engineering technicians "senior engineering technicians," rather than "certified engineering technologists."

Both of these measures and the underlying concept of the engineering technician were questioned from the floor, and a recommendation was made that the measures be referred back to the committee for further study. Comments from the floor seemed to throw doubt on the legality of the measure as it applied to various state registration laws. In favor of the recommendations, it was argued that it was better to act in an area where action was obviously needed than to avoid the issue by a referral to committee. Considerable discussion served, however, to clarify many points raised, and both recommendations were adopted.

Similar lines of discussion were followed on a motion to reconsider NSPE endorsement of the NCS BEE Model Law, approved at a previous Board meeting. It was argued that state societies had not been given enough time to look over the Model Law before it was endorsed by the Board. The prevailing point of view was apparently expressed in statements that the Model Law was merely a guide for the states, that it was always subject to revision, and that it would be virtually impossible to get all of the states to agree to a single ver-

Des Moines Meeting

Varied activities were the lot of those attending this year's Winter meeting at the Fort Des Moines Hotel. At left, Francis K. McCune, vice president for engineering services at General Electric Co., tells the group about the Engineering Team in Industry. Center, the Mississippi State University Student Chapter is welcomed aboard by NSPE President Noah Hull. Right, Murray L. Wilson presents the report of the Organization and Functions Committee to the Board. Wilson has been nominated by the Nominating Committee for the office of NSPE president.

sion of the Model Law. The motion to reconsider failed.

Other issues decided by representatives of the 47 states in attendance included: (1) To re-refer to committee a proposal to limit the size and representation of the NSPE Board of Directors; (2) to adopt and publish in the AMERICAN ENGINEER six determinations by the Board of Ethical Review; and (3) to adopt a new rule of conduct on competitive bidding.

The new rule reads: "Competition between engineers for employment on the basis of professional fees or charges is considered unethical practice by all professional engineering groups. Any engineer who is requested to submit a bid to an owner of a governmental body should remove himself from consideration for the proposed work."

Slightly less controversial, although far reaching, were measures adopted regarding the professional engineer making a career in the uniformed services. Recommendations were made by Wesley Gilbertson as chairman of the Functional Section for Engineers in Government Practice. The four point program of recommendations is aimed at giving the military engineer a more professional position, while at the same time enhancing the engineering manpower position of the military services. The four points are:

(1) To recommend to Congress an increase in basic pay for all officers in all branches of the uniformed services between the period of 0 to 7 years of service so that salary levels for engineer officers in the lower grades will be more favorably competitive with rates for engineering graduates in other fields of endeavor;

(2) To support passage of legislation which would authorize personal contracts with reserve officers to assure tenure on active duty of a specified period of years with provision for compensation in the event of his involuntary termination prior to the contract term;

(3) To support legislative authorization to provide flexibility in the regular officer/reserve officer ratio in certain selective cases where grade deficiencies exist under the present ratio of 50:50 for Navy and 40:60 for the Army and Air Force; and

(4) To support adoption of a professional program by the chief of each of the uniformed military engineer organizations which would encourage all engineer officers to obtain a master's degree in engineering and to become registered under the laws of any state, territory or the District of Columbia.

Further along the same line, a motion from the floor following the report called for study by the Uniformed Service Subcommittee of the Functional Section on a measure to enhance the status of the engineer in the military.

In another Board action, Society endorsement was given to the Junior Engineers and Scientists Summer Institute program now sponsoring summer institutes at several universities across the Nation, along with similar programs aimed at creating understanding among high school students about the engineering profession.

The NSPE Board also heard a three-way discussion of the engineering team by Past NSPE President Clark A. Dunn, F. K. McCune, vice president of General Electric Co., and M. R. Lohmann, dean of the College of Engineering at Oklahoma State University.

Approaching the problem from the educational standpoint, Dean Lohmann told the Board of the drastic changes that are taking place in current engineering curricula, with increasing stress on theoretical, rather than practical subject matter. Lohmann pointed out that time formerly spent on such skills as engineering drawing is now spent on mathematics, engineering theory and other more scientific" topics. Taking mathematics as an example, Lohmann said that courses he had taken as a graduate student when he went to college were now being taught as early as the second or third year of undergraduate work. According to Lohmann this underlines the need

Dean Wilson Speaks

Both work and relaxation went to make up the schedule for directors attending the Des Moines meeting. At left, Western Regional directors meet to discuss problems pertaining to their state societies. These meetings were followed by regional luncheons. At right, directors and members of the Iowa Engineering Society hear banquet speaker Dean Curtis L. Wilson, P.E., dean of the School of Mines and Metallurgy, University of Missouri, speak on "The Strength of a Nation."

for adequate development of engineering technicians to take over the tasks in which engineers are no longer being trained.

As an industry spokesman, F. K. McCune of General Electric outlined the different levels of engineering work that are handled at GE, ranging from the almost purely theoretical to the extremely practical. In each of these areas, he said, many kinds of engineers are needed, with an increasing need for higher educational and experience standards.

The reason for this, McCune said, was that today heavy outlays of cash accompany almost any development program, and that "with regard to feasibility, cost and anticipated needs of people, we should look to those who are experienced in the engineering categories." McCune added that in many development programs today it is virtually impossible to allow anything less than the right approach the first time. Today's engineers, he said, are working with "commitments of resources so large that they can be ruinous if a wrong technological path is taken."

In other Board action, it was decided that the 1963 Board meetings would be held in San Antonio, Texas, Cleveland, Ohio, and Asheville, North Carolina. The Annual Meeting will be in Cleveland with the Winter and Fall meetings in San Antonio and Asheville respectively.

The Board also voted to provide support to programs that would ease the plight of engineer refugees from Cuba. Specifically, the Board said it would encourage these engineers in finding employment in the U.S., within the bounds of engineering registration laws, and would urge the President to provide funds to help the refugees through some organization experienced and capable in aiding such groups.

The following groups received recognition for leading their respective areas in the membership contest: Group I, Idaho; Group II, Mississippi; Group III, Florida; Group IV, Alabama; Group V, Missouri; and Group VI, Texas. Also, Arkansas, Georgia, Minnesota, North Dakota, Ohio, Pennsylvania and Wisconsin were awarded small skunks for having the poorest membership records. Membership Chairman H. F. Pierce said the skunks would be passed on to other state societies as the present recipients improved their positions.

Those attending also saw slides and movies which were used in connection with the 1961 National Engineers' Week. The movies, narrated by Ben Grauer, were to be used as television spots, and were available to state societies and local chapters.

NSPE Board members attended a banquet, sponsored by the Iowa Engineering Society for both groups. Speaker at the banquet was Dean Curtis L. Wilson of the Missouri School of Mines and Metallurgy who spoke on "The Strength of a Nation."

Regional meetings were held by NSPE Board members as part of the over-all program and were followed by Regional lunches.

General Chairman for the three-day meeting was James R. Foster, P.E., whose committee worked hard to make the meeting a success. Ladies' program was under the direction of Mrs. James R. Foster. Arrangements for the banquet were handled by the Iowa Engineering Society.

Hull Warns Board Members of Possible Water Gap

The U. S. may be in for a "disastrous water gap by the end of the 1960's," NSPE President Noah E. Hull told Board members at this year's Winter Meeting in Des Moines, Iowa.

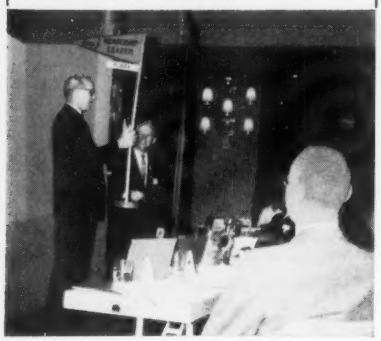
Hull said, "There is evidence that we will likely be the first major industrial nation to face a full scale, permanent fresh water shortage." He called for "massive engineering efforts" to be applied to this problem, "right now, and on a National, state, and local level before we get to the point of Nation-wide industrial curtailment due to uneconomical water supply."

The NSPE President suggested that the effort be directed at some method of converting sea water into usable fresh water.

Foreign Visitor

International flavor was lent to the Des Moines Board meeting by Boris Runov (right), being welcomed to the meeting here by Milton E. Carlson, president of the Iowa Engineering Society. Runov is a Russian exchange student currently attending Iowa State University at Ames, Iowa.

Membership Leaders



Membership banners were presented in the Grand Ballroom of the Fort Des Moines Hotel to the following State Societies who lead their respective groups in the membership contest: Idaho, Missouri, Florida (shown here), Alabama, Mississippi and Texas. Presenting the banner is Membership Chairman H. F. Pierce.

Former NSPE Officer Died Recently in New York

Mr. Zurmuhlen

Frederick H. Zurmuhlen, former national officer of NSPE, died recently at his home in New York City.

Zurmuhlen had been public works commissioner for 13 years in the City of New York, longer than any other commissioner, and during that time negotiated $675 million in city building projects. Earlier he had worked with the Federal Public Works Administration, the Reconstruction Finance Corporation, and with the consulting firms of Corry & Zurmuhlen, and Sibley, Fetherston & Zurmuhlen.

Active with the New York State SPE, he served as president of the State Society, as national vice president from 1943-44, and as business representative for the AMERICAN ENGINEER from 1942-45. Among his many honors, he was named "Engineer of the Year" by five New York City Chapters of the NYSSPE in 1956, by the State Society in 1959, and by the Brooklyn Engineers Club in 1960.

Mid-April Conference Set for State Presidents

The NSPE State Presidents' Conference will be held once again on the campus of Purdue University, West Lafayette, Indiana. The 1961 session will meet April 13-15 with headquarters in the Purdue Memorial Union.

The purposes of the conference are: (1) To permit an exchange of state society administrative experiences; (2) to better acquaint the state presidents with professional society philosophy and programs; and (3) to provide state presidents with an opportunity to pose questions arising in the state society on which other states may have had experience.

In an official memorandum to all state presidents, NSPE Executive Director Paul Robbins advised that it was highly desirable that the person who is to have the responsibility for the state society administration during the 1961-62 term attend this conference.

Reservation cards for arranging lodging at Purdue will be forwarded to all scheduled to attend.

to Remember

Ohio Society—Annual Meeting, March 16-18, Dayton-Biltmore Hotel, Dayton, Ohio.

Wisconsin Society—Annual Meeting, April 6-8, Loraine Hotel, Madison, Wisconsin.

NSPE State Presidents' Conference—April 13-15, Union Club, Memorial Center, Purdue University, West Lafayette, Indiana.

Florida Engineering Society—Annual Meeting, April 19-22, Angebilt and San Juan Hotels, Orlando, Florida.

Illinois Society—Annual Meeting, April 20-22, Pere Marquette Hotel, Peoria, Illinois.

Kentucky Society—Annual Meeting, April 21-22, Louisville, Kentucky.

South Dakota Society—Annual Meeting, May 6, Sioux Falls, South Dakota.

New Jersey Society—Annual Meeting, May 5-6, Ambassador Hotel, Atlantic City, New Jersey.

Vermont Society—Annual Meeting, May 13, Montpelier Tavern, Montpelier, Vermont.

Pennsylvania Society—Annual Meeting, May 18-20, Pittsburgh, Pennsylvania.

Maryland Society—Annual Meeting, May 19-20, Carvel Hall, Annapolis, Maryland.

Montana Society—Annual Meeting, May 20, Rainbow Hotel, Great Falls, Montana.

Connecticut Society—Annual Meeting, May 20, Hotel Taft, New Haven, Connecticut.

Michigan Society—Annual Meeting, May 25-27, Rackham Memorial Building, University of Michigan, Ann Arbor, Michigan.

California Society—Annual Meeting, May 26-27, Casa Munras Hotel, Monterey, California.

National Society of Professional Engineers—Annual Meeting, July 4-7, 1961, Olympic Hotel, Seattle, Washington.

NSPE Staff Member Addresses Engineers

Col. Michael J. Blew (ret.), NSPE membership representative, recently addressed Army engineers at the Fort Belvoir Research and Development Laboratories on the requirements and advantages of becoming registered. Col. Blew is seen with Col. Herman Johnson (USAR) (r.), chief of the Civil Engineering Department at the Lab.

Scenic Washington State

Mount Rainier, top tourist attraction in Washington State, presents this view to visitors at Sunrise in Yakima Park. This section of the park is reached via the White River entrance on the east side of the mountain. Rainier National Park has 97 miles of paved roadway, 26 glaciers, great forests, alpine meadows and 90 miles of trail for hikers.

Correction

The photo caption at the top of page 46 in the January AE should have credited not the Washington but the Wenatchee Chapter of the Washington Society of Professional Engineers with the erection of a monument commemorating Marvin Chase, the first state hydraulic engineer for Washington.

Seattle Chapter Plans Early for July Meeting

Under the direction of David W. Harris, president of the Seattle Chapter of WSPE, a score of committees have been hard at work since October blueprinting what promises to be one of the most interesting and entertaining annual meetings ever held by NSPE.

The well known Olympic Hotel in Seattle will be the official headquarters for this 27th Annual Meeting, which will open on Tuesday, July 4, concluding with the annual banquet Friday, July 7.

The July dates allow combining attendance at the meeting with a vacation for members and their families in one of the most beautiful areas of the country. The social program planned for the meeting has been balanced in relation to the professional meetings. The high point of the social program will be a family boat trip Thursday evening, July 6. This trip will be a six and one-half hour water tour through Government Locks which connect Seattle's fresh water lakes to Puget Sound, across the Sound to Kiana Lodge for a traditional "salmon bake," and return to Salmon Bay. The ladies will travel even farther for their Wednesday luncheon when they will make the last portion of the trip by ski lift to the Thunderbird Inn at Snoqualmie Pass.

Following the meeting four special tours have been arranged for those in attendance: A 6-day Alaska tour combining air, rail and boat leaves Seattle July 7; an air tour to Honolulu, with side trips to the islands of Maui and Hawaii, leaves Seattle July 8 and returns July 16; two local trips—a one-day tour of the Skagit hydro-electric project on July 8; and a one-day excursion by boat to old world Victoria, British Columbia, are also on the agenda.

Subsequent issues of the AMERICAN ENGINEER will carry more detailed information on the entire annual meeting and post meeting tours. Engineers will find plenty of inducements to make this a really memorable family vacation!

Three National Groups Will Be Led by Kansans

Murray A. Wilson, P.E., 1961-62 NSPE presidential nominee, is one of three Kansans who have been chosen to lead major national organizations.

Kansas is also the home of the 1961-62 president of the Associated General Contractors of America, M. Clare Miller of McPherson, Kansas, and the incoming president of the Associated Equipment Distributors, Richard R. Newlin of Kansas City.

Wilson, who will take office at the July annual meeting in Seattle, is executive director of Wilson & Co., engineers and architects of Salina, Kansas. Miller and Newlin both took office in February. The fact that all three honors came to the State in 1961 has added significance considering that Kansas is presently celebrating the 100th anniversary of its statehood.

"Bring in one for SIXTY-ONE"

One more registered engineer, or one more engineer in training, who brings his own abilities to support one chapter's programs will make each state society stronger, giving the National Society a firmer foundation for promoting the entire profession.

By Mrs. Clark A. Dunn, Chairman, Ladies Auxiliary Advisory Committee.

The Women's Auxiliary to the Louisiana Engineering Society is one of the oldest in the United States. It was founded in 1932 and has given 29 years of service to the profession. They not only assist the men's organization when needed for conventions, meetings and social gatherings, but they have an impressive program of philanthropies beneficial to the engineering profession.

The parent organization is located in New Orleans and has over 300 members. It has three funds available for philanthropies, a scholarship which is granted annually to an engineering student at Tulane University and a student loan fund and a fellowship fund, both of which are in the form of an endowment to Tulane University. A fellowship grant to a graduate student in engineering has been given twice since it was established in 1952.

In addition to the parent organization in New Orleans, four chapter auxiliaries have been formed at Alexandria, Baton Rouge, Lake Charles, and Shreveport. All operate under the constitution of the Women's Auxiliary and have a common yearbook. Each chapter has its own service projects as follows: Alexandria Chapter has a scholarship fund and a student loan fund, both of which benefit engineering students at Louisiana Polytechnic Institute at Ruston; Baton Rouge Chapter has an educational loan and scholarship fund, both of which benefit engineering students at Louisiana State University; Lake Charles Chapter, which is only two years old, makes an award to a graduating engineering student at McNeece State College; and Shreveport Chapter has a scholarship fund which benefits students of engineering at Louisiana Tech.

We are happy to announce the birth of three new chapters in the state of Washington. One has been organized at Bremerton with Mrs. E. A. Branes as president, one at Tacoma with Mrs. Conant Dodge as president, and one at Walla Walla with Mrs. Leland B. Jones as president. Also, the plans for a state auxiliary are taking shape rapidly according to Mrs. Paul H. Symbol, temporary chairman. It looks like the state of Washington is going all out to show us a wonderful time in Seattle next summer.

Many auxiliaries are actively assisting chapters with observance of Engineers' Week. In the Riverside-San Bernadino Chapter of California the ladies are co-sponsoring with the parent chapter a poster contest in the high schools in Riverside. It is progressing well and will probably become an annual event.

Eric H. Wang, P.E.

Eric H. Wang, P.E., member of the New Mexico Society, died recently. Working with the Air Force, Wang had close association with full scale nuclear testing dating from the early tests in 1950. Registered in New Mexico and Ohio, he was also a member of ASCE, and the American Association of University Professors.

Ernest F. Fox, P.E.

Ernest F. Fox, P.E., retired division engineer of design in the office of the president of Bronx Borough, died recently at the age of 87. He was a charter and life member as well as the first financial secretary of the New York State SPE. An artist and delineator as well as an engineer, many of his accomplishments are in the fields of highways and bridges.

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Robert H. Crone, P.E.

Robert H. Crone, P.E., engineering business development representative of Ebasco Services Incorporated, died recently in Orange, N.J., at the age of 60. Concerned mainly with the design and construction of hydro-electric power facilities, Crone was registered in New York, New Jersey, Colorado and North Carolina. He was active in the New York State SPE.

Thoughts on Professionalism...

By PAUL H. ROBBINS, P.E.
NSPE Executive Director

Professional Discussions at the Chapter Level

IT has been inherent in the philosophy of NSPE since its founding that its area of activity and concern in the engineering profession involves those matters of a nontechnical nature common to all engineers. NSPE in its programs has concentrated zealously on areas of professional concern. In the numerous discussions over the years on the organization of the engineering profession, it has consistently taken the position that the three level organization based on the local chapter is best suited for consideration of these problems. It has also been fundamental in NSPE's philosophy that these are problems which cannot be solved at the national level only, but are important and become real for the members of the Society to the extent that they are discussed and activated at the state and chapter levels.

IT was thus disturbing to receive a letter recently in which a sentence stated: "Our chapter endeavors to have at least one meeting each year on professional matters." The reason for the existence of an NSPE chapter is to provide a forum and organizational structure in which professional matters may be discussed, effective programs activated and the professional status and recognition of engineers enhanced. There is serious question that an NSPE chapter should exist for the purpose of technical discussions regardless of how interesting they may be.

EVERY chapter program chairman is, of course, torn between several considerations: (1) He must obviously have a continuing program of interest in order that attendance will be maintained; (2) he must, of course, retain a variety of programs, for what may interest one member may not interest another; and (3) since in many areas the NSPE chapter is the only organized group of engineers, there are many demands upon him for a particular type of program of interest to a specific group within the membership.

NEVERTHELESS, he must continuously keep in mind that the reason for the existence of the professional society is to discuss professional matters. Unfortunately, too many engineers, many of them members of the professional society, are only mildly concerned with many of the professional problems the engineers of the Nation face. It is a challenge to every chapter program chairman to develop a program for his chapter meeting which is not only interesting and challenging to the membership but which at the same time also provides them with information they would perhaps not otherwise receive. A chapter program should encourage members to concern themselves with professional development and at the same time create the desire on the part of all members to attend the chapter meeting. Unfortunately, too often at the chapter level members, and sometimes even officers, feel that the whole chapter program is completed with the scheduling of a chapter meeting. Every member should lend his assistance in encouraging the entire chapter membership to give attention to not only the meeting but also the broad opportunity the chapter has for activity in many facets of professional development.

LETTERS

(Continued from page 4)

relations to clients, or fee splitting investigations. And I could also do without the epithets equivalent to ambulance chaser, shyster, and "sharp" practitioner. Do you think the subject could be studied by a committee?

ELI SILVERMAN, P.E.,
Valley Stream, N.Y.

'Art' Is Needed . . .

Dear Editor:

There is no question "More Humanities or More Engineering?" (AE, Jan., 1961). Engineering students today, without doubt, are given a good background for the work they will eventually do.

Our educational institutions are making only one serious mistake. They are not developing in the student a proper attitude toward his status as a new graduate. A student should realize that an engineer is not a scientist and he is usually not hired to be placed in a laboratory with thousands of dollars worth of equipment to play with.

The great majority of us have been hired to use our training, skill and ingenuity to make money for the company or firm for which we work. Our educators paint a rosy picture with such words as "prestige, responsibility, income and demand;" these are not false sketches of the engineering profession, but many new graduates are disappointed and disillusioned because, as Mr. Stimmel pointed out, they are oftentimes put to the job of "cutting brush."

What your author hasn't considered is that in school our young engineer learned the science, but before he can take his place as a professional, and even more important, as an asset to his employer, he must learn the art. Art is defined as "skill in performance acquired by experience, study or observation." Art is a knack; art is a humon contrivance, or ingenuity, as in adapting natural things to man's use.

If that recent graduate in civil engineering who was assigned to cutting brush on the survey party with technicians had been given the right attitude in his college training, he would understand why he was not given command of the party. He was there to learn the art. With a closed mouth and an open mind he would soon learn the skills of these seasoned, experienced and valuable technicians.

After all, the formal education provides only the tools. The art takes even more time and effort. As it is acquired the engineer will be given increasing responsibility. His income will reflect

his own accomplishments and he will gain respect and prestige in measure with the results of his work and executive ability.

Our colleges have dropped a word from the engineering student's dictionary—the word "apprentice," which according to the order of things, and with Webster as my advisor, appears before "professional."

H. K. MONROE, P.E.,
Piqua, Ohio

CLIMATE

(Continued from page 36)

who have spent time in the labor relations field have become used to what the lawyers call in trade union bargaining 'the allowable exaggerations of bargaining.' We are forced to accept this as a tactic, even when in the extreme it involves misstatements or fabrications made as a means to an end. But trade unions do not represent, for the most part, people whose productivity and creativity depend so uniquely on their mental and emotional states, people whose minds and emotions need to be concentrated on the professional task at hand. Here lies the crux of the paradox of professionalism and engineering unionism. One cannot expect best results from a professional group, if they become embittered against those for whom they work."

Mr. Shea saw engineers as "clearly part of management" since "their decisions and recommendations affect the spending of large amounts of money, the efficiency and flexibility with which facilities may be used, the form and amounts of large inventories, the processes used in making things, the quality and economy with which these are made."

Some idea of the feedback which is available from industry to the engineering schools was illustrated in a Conference report on general impressions of "professional climate" given by engineering professors who spent a summer session at four industrial firms. The firms were Boeing Aircraft, DuPont, Bell Telephone Laboratories and General Electric. The faculty members were surveyed and the report came up with four general conclusions.

• The men who replied to the questionnaire had concepts of professional climate consonant with

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that of the definition of professionalism put forth by the ASEE Committee.

- Company managements are in general aware of a need to develop a professional climate and indeed succeed in the main.
- Where there are shortcomings, these often relate to lack of appreciation on the part of first level supervision. This may indicate a failing of engineers themselves in respect to professional attitudes.
- Companies were criticized for: Not providing sufficient of the externals; operating on an emergency basis which mitigated avowed policy for professional development; and not utilizing engineers to their full capacities.

Another facet of the solicitation of the views of engineers themselves regarding the professional climate in industry was presented in Cincinnati by a report on *Professionalism In Industry*, an executive research survey made for the Professional Engineers Conference Board for Industry, in cooperation with NSPE. Hugh L. Rusch, vice president of Opinion Research Corporation, the firm that made the survey report, used a series of slides to bring out what was found about what engineers and engineering managers mean by professionalism and how they think it can best be advanced.

Mr. Rusch told the group that a series of interviews with engineers and managers brought out that 90 per cent of the managers questioned stated that they regarded engineers among the employees making the most valuable contribution to the company, but less than half of the engineers felt that they were so regarded by management. One fourth of the engineers stated that management tries to provide a creative atmosphere, but nearly half of the managers claimed that management tries to provide such an atmosphere. Sixty-eight per cent of the managers indicated they believe management shows genuine respect for engineers; however, only 36 per cent of the engineers agreed with this. Mr. Rusch said this suggested that companies should not only re-examine whether they are doing enough, but also whether they are

communicating their efforts to engineers. If companies are doing all the things they say they are, many of these programs and policies are not now getting through to engineers, he added. The survey also found a considerable difference in professional attitudes between engineers in companies which would score high on efforts to encourage and develop high standards of engineering professionalism and engineers in those companies which would not score so high in such an evaluation. Forty-four per cent of the engineers in the above mentioned high scoring companies stated that management really believes in the professional status of engineers, while only seven per cent of the engineers in the second type of company agreed with this. Fifty-three per cent of the engineers in the second type of company said that engineers are sort of a commodity—let go quickly if business is poor, but only seventeen per cent of the engineers surveyed in the high scoring companies held this view.

In looking to the future of professionalism in industry, J. Gibson Pleasants, Procter & Gamble vice president for research and development, called for programs which "will in fact assist the members of the professional engineering societies to be the best alpha, beta, and gamma engineers this world has ever seen but yet which will stop short of developing activities and curriculums intended to imply or actually enforce the obligation to be engineers and nothing else."

Mr. Gibson asked for programs which elevate the individual in ability and propel him forward but which "stop short of restraint or constraint."

The impact of technological change and how devastating it can be for those who do not bring their operational and social methods up to date was heavily stressed by Francis F. Bradshaw, consultant at the General Electric Institute for Advanced Management. Speaking on "Managing Technological Advance," Dr. Bradshaw dwelt upon what he termed the "cultural lag" so often found in industry in the managing of technical and scientific employees.—**End.**

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DOWNS

(Continued from page 41)

work without requiring detailed instructions on every job.

This discussion deals with a small segment of Phillips Petroleum Company—only one and one-half per cent of total employees. It is, however, representative to a degree of practices in locations using a relatively high concentration of engineers.

Summarizing, use of nonprofessional supporting personnel improves the productivity of the engineer, his outlook and morale.

Improved utilization of nonprofessional employees can be accomplished by:

- Extra supervisory effort
- Relieving engineers of as much drafting as possible
- Conducting pre-employment training programs at technical schools for nonprofessionals
- Extensive use of standards and procedures for repetitive work
- Training nonprofessionals to a high degree of competence and providing opportunities to advance to responsible positions
- Development of electronic computer procedures to take over tedious and time consuming computations. Train nonprofessional personnel to carry out the computer procedures
- Providing competent clerical force under the leadership of supervisors who know those areas where clerks can effectively relieve engineers to eliminate need for frequent detailed instructions from engineers
- Encouragement of registration among engineers in the state of their choice

Engineers and nonprofessional people under these conditions feel more important; they are more productive; their morale is improved; each is able to work to the full extent of his capabilities; and fewer engineers and scientists can handle the same number of projects.—**End.**

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ROUSE

(Continued from page 29)

for an engineering education. Chapter-sponsored JETS (Junior Engineering Technical Society) have stimulated interest in preparing high school students for entering the world of engineering. Some girls join JETS to further their chosen interests in things mechanical.

Scholarship awards by industrial firms are making college education available to many high school students. Our Society can become increasingly helpful by bringing together the award sponsors and the deserving students. Greater activity in this field is being planned by finding scholarship donors and by encouraging industry to offer such awards.

The present PR committee has reported an intention to concentrate its efforts and much of its budgeted funds in the direction of the engineering student.

Engineering Educators—Without a professional atmosphere existing in the colleges it is hard to conceive of engineering students having a desire to become registered professional engineers. Therefore, our task in working with the student can become much easier and more rewarding if we can be assisted by the engineering educators, key individuals with great influence on the lives of young students. Presently our PR program is not beamed too strongly toward this public. Much more should be done to encourage registration within faculties of engineering schools.

The professional attitude should be inherent in the educator, but too many find no time to enrich their lives by registration and influence the embryonic careers of their students in the same vein. We should bless and reward the educa-

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tor who gives his learning ones the well rounded and balanced guidance which includes a look at professionalism.

Engineering Management—Here is one of our PR publics which has, until recently, been hard to reach and sometimes difficult to sell on professionalism for its engineering employees. Management has viewed our efforts with some misgivings, but the organized campaigns to unionize registered engineers have shown him how his employees could lose their rights of individual choice and initiative—rights which can be valuable to the management itself.

This public is well remembered by the many publications of our Society and by activities sponsored by our organization on both national and local levels. The *Criteria* is a most valuable guideline for both employer and employee. The constantly revised *Income and Salary Survey* is equally valuable.

Government Officials & Legislators—If our political leaders are to make sound laws and administer them wisely for all the people, they must have sound advice and counsel. With a staff legal analyst and the proper tax status our Society is in a position to boldly and aggressively speak for the members of this Society on matters which may affect their legal or economic status. Such actions are taken without hesitation, although the individual member may seldom hear the details of the accomplishments.

A bilateral flow of information is beneficial to this public and to the Society. The *Legislative Bulletin* fills a great need in both disseminating to the member the legislative programs of the Society and in bringing to them national and state aspects of certain problems and situations facing the profession.

Other Professions—If we are to assume the professional status which we desire in the eyes of all our publics we must maintain a standard in keeping with other recognized professions. We should also be willing to share the quality of behavior which commands respect, live by our codes and rules of conduct. There is a common ground in all professions; we should surely establish distinct lines and hue strictly and relentlessly to them.

General Public—By the nature of the general public we must use our most diversified program material in reaching them with our story. National Engineers' Week is an excellent sample of the kind of educational material required for effective use in this category.

The public should be told of methods for selecting engineering services by evaluation rather than by competitive bidding. They should know of the incompatibility of unionism with engineering professionalism. Engineering achievements, problems and situations of general interest should be kept before the public through the press and other forms of mass media.

The individual professional engineer can do a great good for the PR of his society in his own community by being a good citizen and participating in civic projects where he lives and works. His actions and deeds will influence public opinion toward a recognition of the engineer as a person whose professional attitude is guided by the ideals of public service.—**End.**

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Progress in Products

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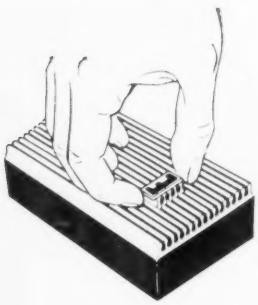


The development of a simple printing and stamping set with interchangeable letters, numbers and punctuation marks has just been announced by American Stamp Works. Each letter and number is grooved to snap into and out of the grooves of the holder. User can set any copy in seconds. Numbers and letters set flat and tight into grooved holder assuring perfect alignment with completely even and sharp impressions every time.

PARKER METERS — Item 31

New version of the parker S 35 surface mounting panel meter has improved case design with satin-black finish; also available in colors. Electrical overload tolerance is 10,000 per cent (100 times full scale sensitivity of basic movement), or 50,000 per cent for the 1 MA movement. The black plate of this unit is fitted with an O-ring seal to keep out the dust, moisture and other foreign matter.

PAPER TAPE READER — Item 32

Control Data Corporation has released its new model 350 high speed punched paper tape reader. The model 350 is a photoelectric reader which reads 5, 7 or 8 level punched paper tape rate of 350 characters per second. The reader uses solid state components throughout and is available either with or without reading circuitry. The unit can be programed to operate start/stop a character at a time, or to read continuously stopping immediately after receipt of a stop code prior to the next character, operating at 350 characters per second in either mode. The dimensions of the model 350 paper tape reader are 9"x11½" x10" and its weight is 34 pounds.

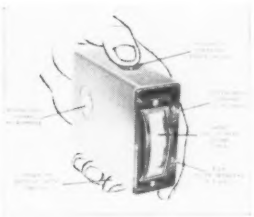
GOGGLE VALVE — Item 33

A newly designed mechanical goggle valve, used in steel mill gas mains, has been placed on the market by Kopper Company, Inc. The valve features all-welded, stress relieved valve bodies and has been shop tested under conditions of elevated temperature and pressure. The jackscrews are made of chrome nickel alloy for maximum toughness and strength. In addition, the goggle plates and plate seats are replaceable while the valve is in service. The valve body is constructed of two identical weldments designed to withstand a clamping stress of 1,000 pounds per linear inch sealing circumference.

WEIGHING SCALE — Item 34

The Douglas Homs Company announces development of a new type of completely self contained portable weighing scale designed for highway and general construction control work as well as all applications where scale portability is essential. It is stated that the portable Homs scales are very suitable for field density, compaction and all other soils engineering determinations as well as concrete aggregate weighing and bituminous test procedures. A combination handle and beam guard permits transporting the scales as easily as a piece of luggage. A unique platform lock completely secures the lever system, eliminating the need to rebalance and readjust the scales each time they are moved.

SURVEY METER — Item 35



A highly accurate, inexpensive sound survey meter which is miniature in size, rugged and stable in performance due to its fully transistorized circuitry, and which can be used with its matched pick-up as a vibration meter, has been announced by the Korfund Company, Inc. Designed for one-hand operation, the meter weighs only one pound (with battery) and features click-action knurled, finger-tip controls for both the attenuator and the ASA filter network selectors.

NUCLEAR GAGES — Item 36

A new line of nuclear gages for noncontacting thickness density measurement and process control has been announced by Radionics Incorporated. The basic gaging unit, called a micro-meter, differs from beta gages now on the market in that it utilizes a highly specialized technique of scintillation detection developed by Radionics. The detector permits the use of either beta or gamma radiation, extending the range of application from the thinnest tissue paper to a foot of steel or more. The high speed of response—down to 10 milliseconds—permits extremely high speed inspection.

DRAFTING TAPE — Item 37

New boxes developed by Chart-Pak, Incorporated, for its complete line of solid color and pattern tapes offer ready access to tapes. One corner of the box is perforated for easy removal allowing visual selection. A convenient rack of several boxes can be made in seconds by lining up the boxes and taping them together. Perforation of the box resulted from Chart-Pak's recognition of the need for at-a-glance selection of tape wanted for use. Each box of tape is now its own visual storage unit.

This feature describes new products of general interest to professional engineers. For further information, circle the item number in the Readers' Service Dept. and mail to AMERICAN ENGINEER.

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